FIG. 1

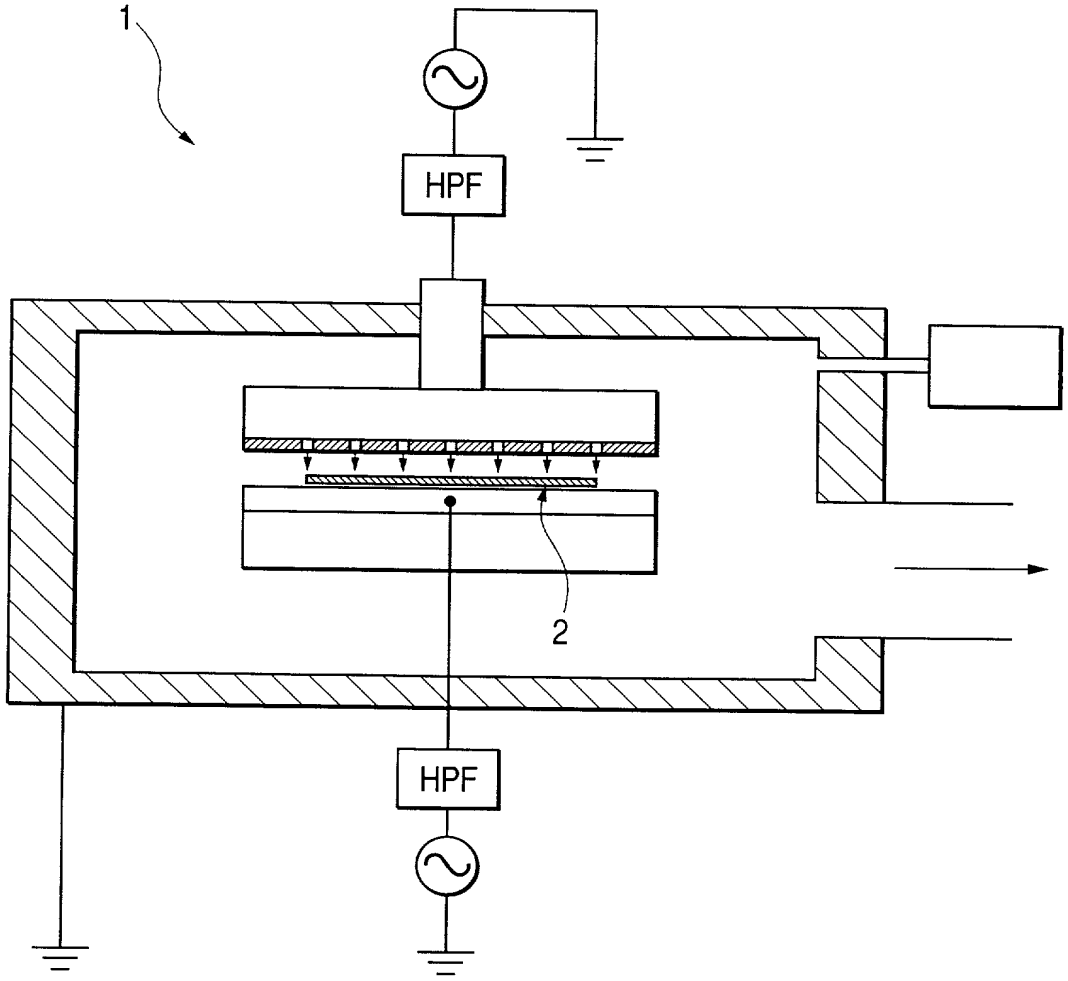


FIG. 2

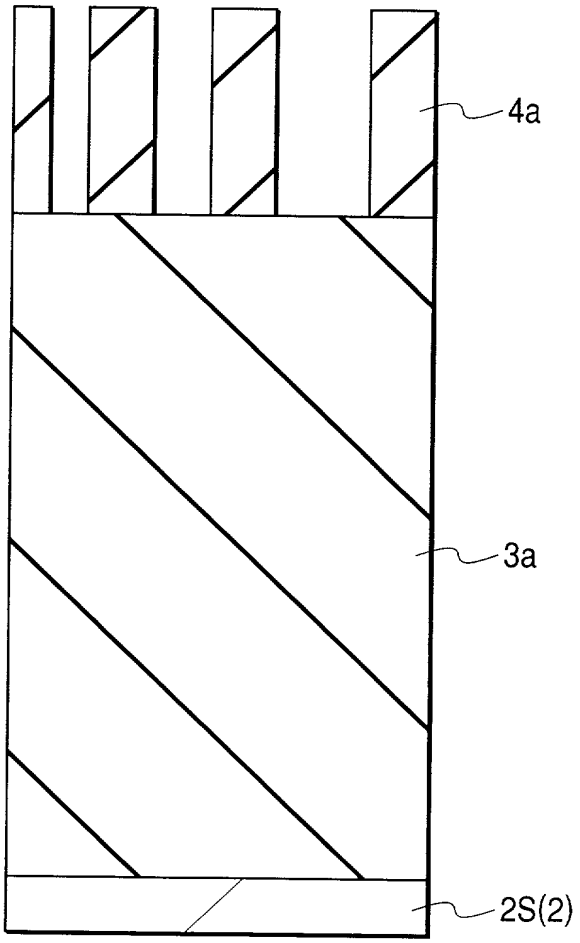


FIG. 3

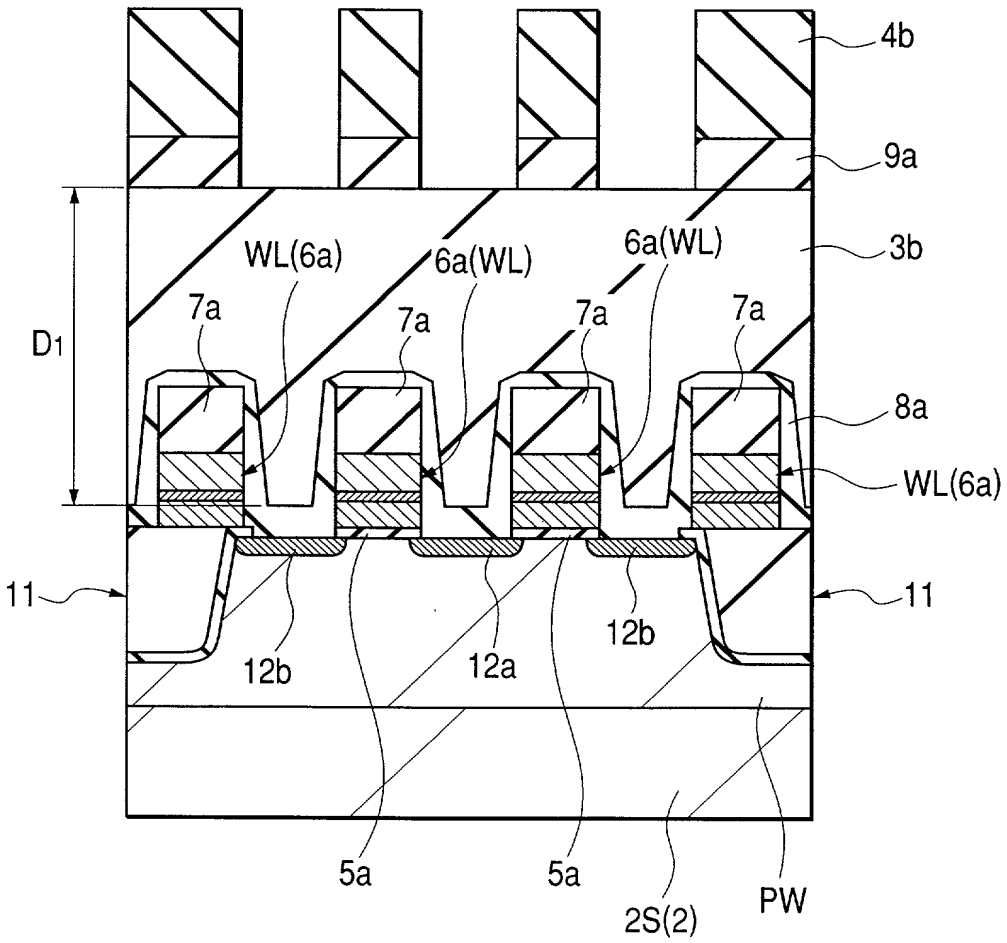

4b
9a
3b
WL(6a)
6a(WL)
6a(WL)
7a
7a
7a
7a
D1
8a
WL(6a)
11
11
12b
12a
12b
5a
5a
2S(2)
PW

FIG. 4(a)

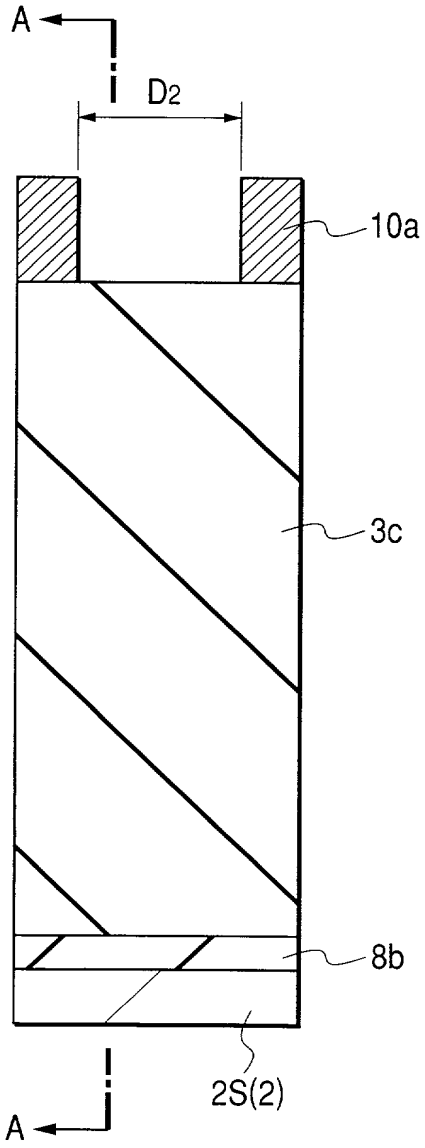


FIG. 4(b)

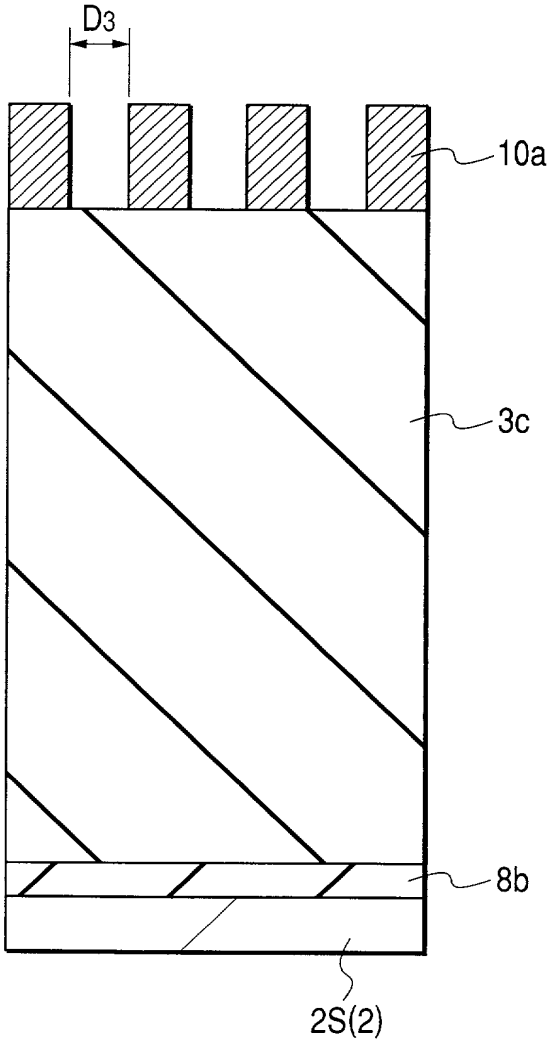


FIG. 5

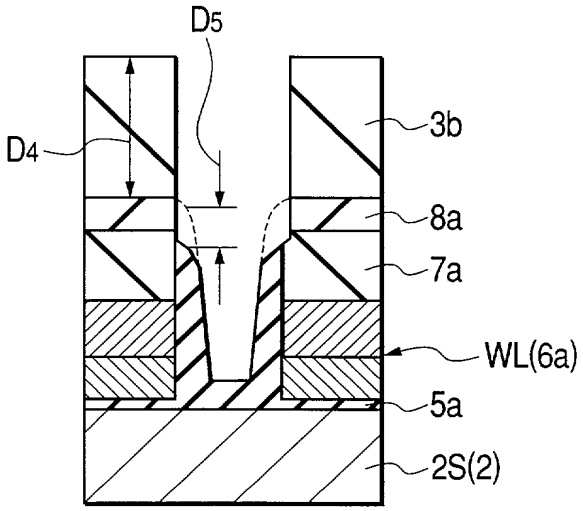


FIG. 6

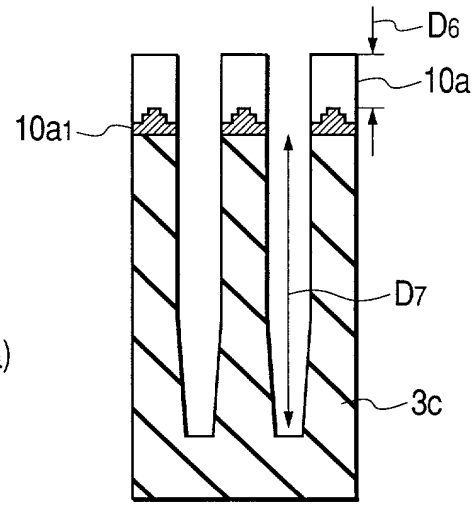


FIG. 7

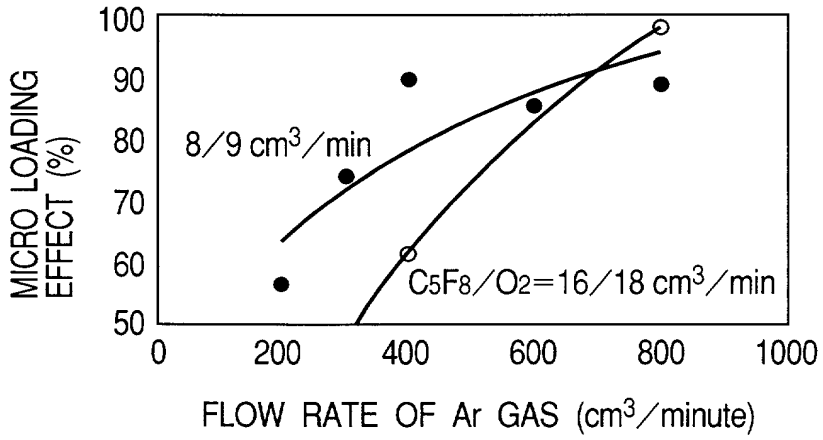


FIG. 8(a)

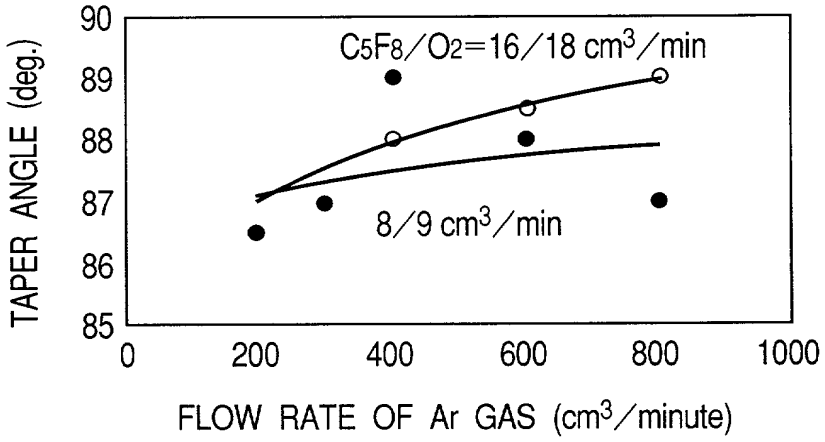

90
89
88
87
86
85
TAPER ANGLE (deg.)
C5F8/O2=16/18 cm3/min
8/9 cm3/min
0
200
400
600
800
1000
FLOW RATE OF Ar GAS (cm3/minute)

FIG. 8(b)

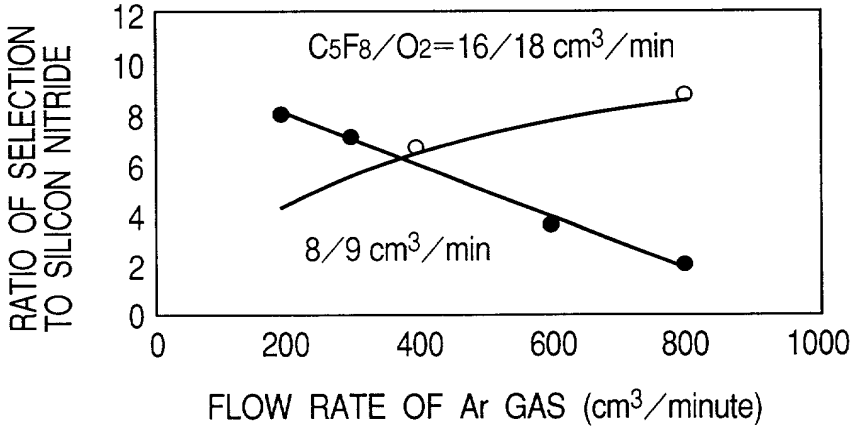

12
10
8
6
4
2
0
RATIO OF SELECTION TO SILICON NITRIDE
C5F8/O2=16/18 cm3/min
8/9 cm3/min
0
200
400
600
800
1000
FLOW RATE OF Ar GAS (cm3/minute)

FIG. 9(a)

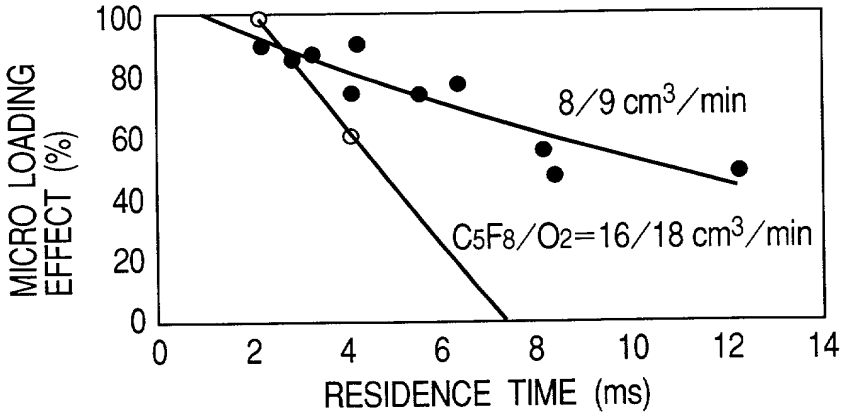


FIG. 9(b)

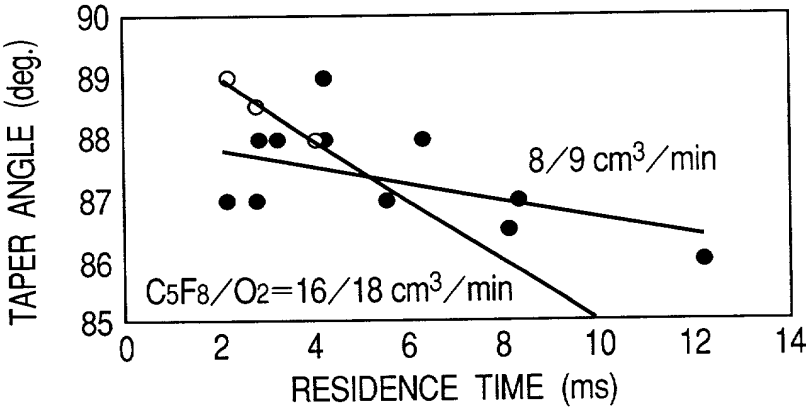


FIG. 9(c)

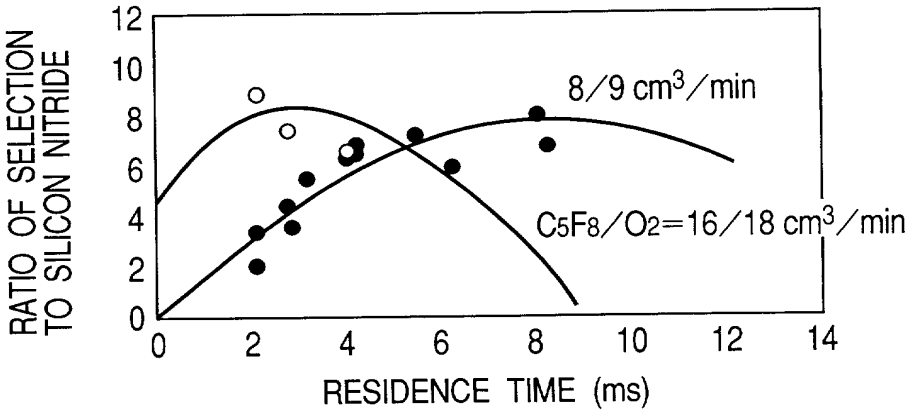


FIG. 10(a)

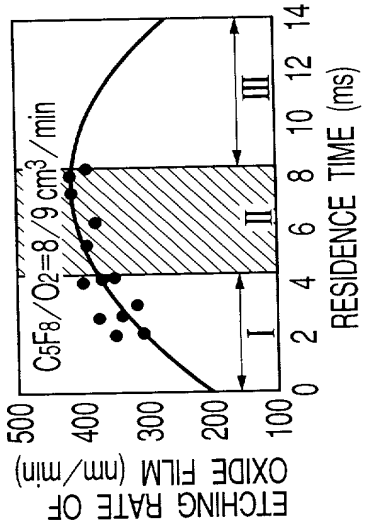


FIG. 10(b)

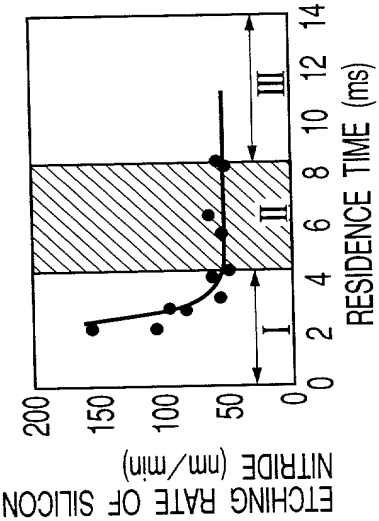


FIG. 10(c)

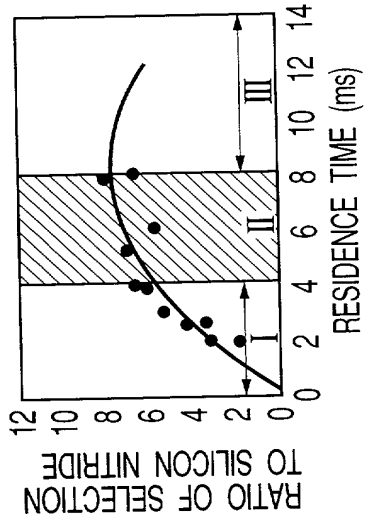


FIG. 10(d)

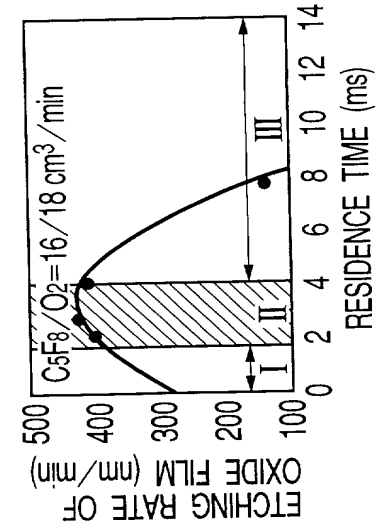


FIG. 10(e)

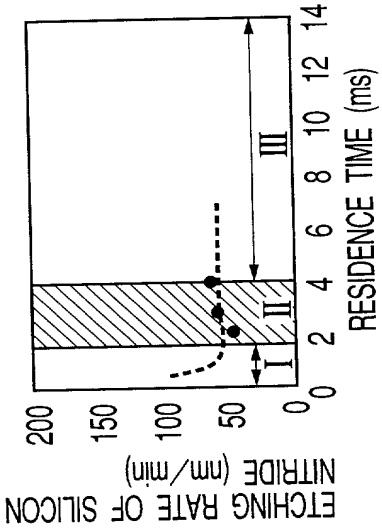


FIG. 10(f)

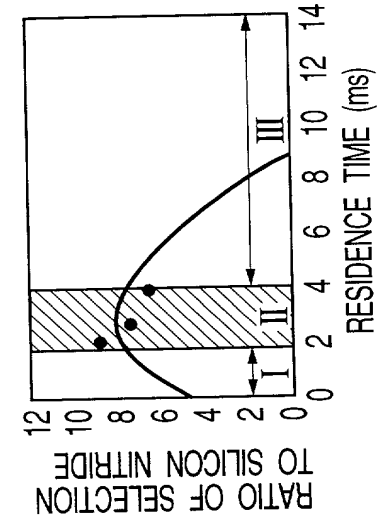


FIG. 11(a)

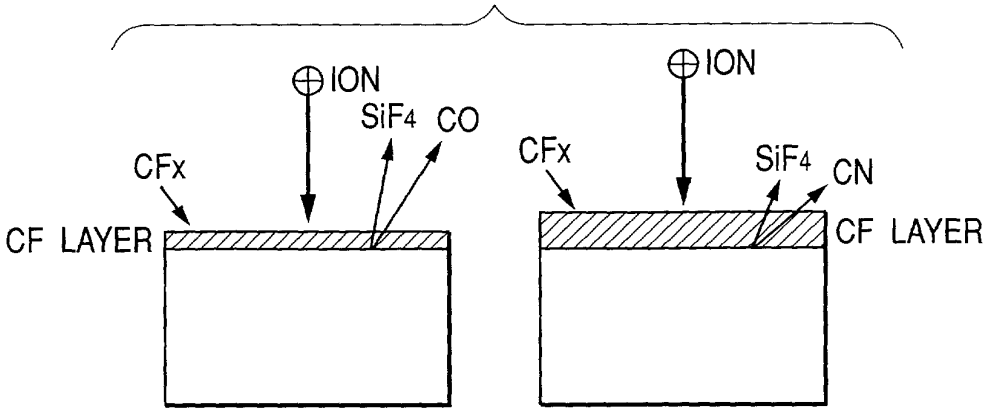


FIG. 11(b)

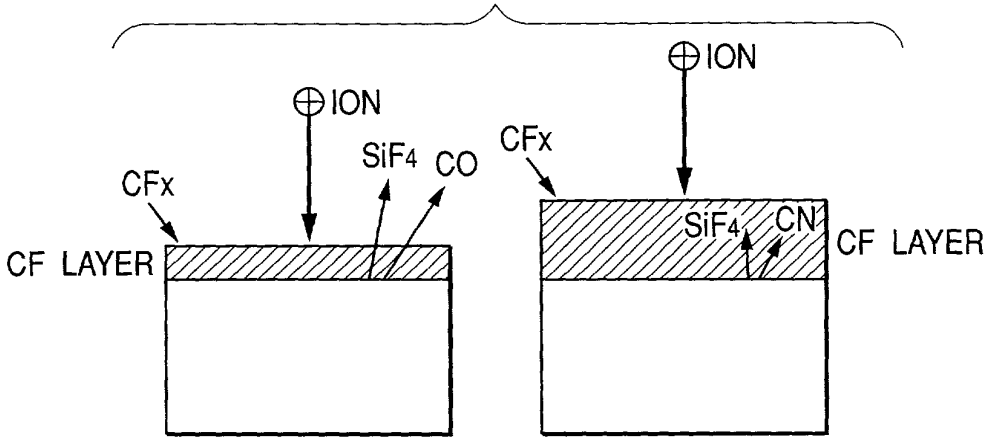


FIG. 11(c)

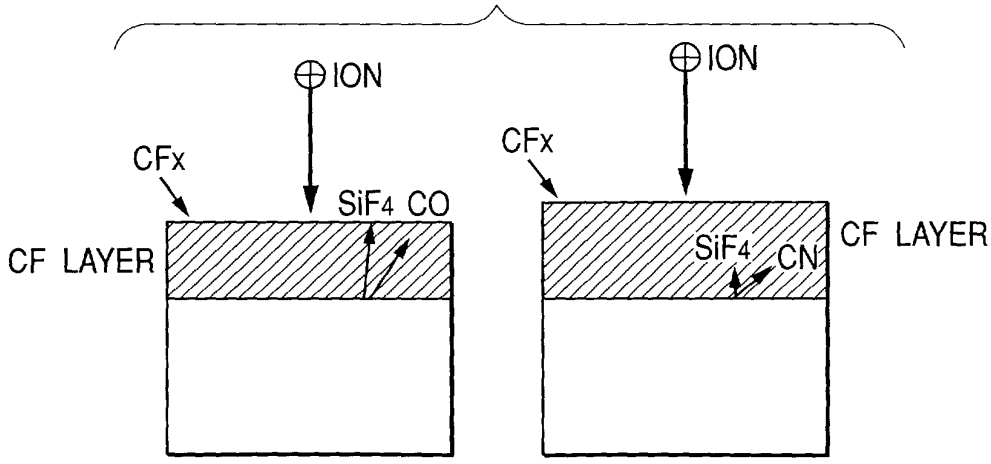


FIG. 12

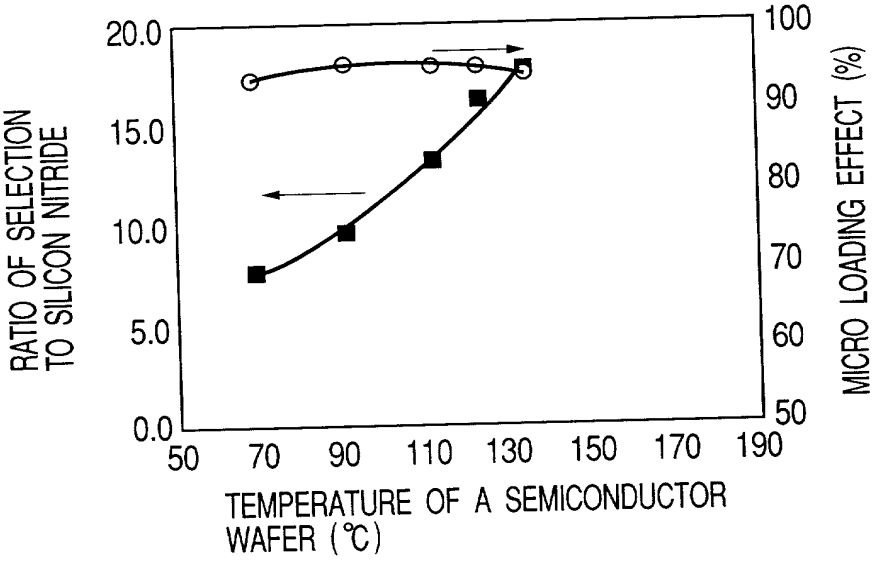

RATIO OF SELECTION TO SILICON NITRIDE
20.0
15.0
10.0
5.0
0.0
100
90
80
70
60
50
MICRO LOADING EFFECT (%)
50
70
90
110
130
150
170
190
TEMPERATURE OF A SEMICONDUCTOR WAFER (℃)

FIG. 13

PARAMETERS			
PRESSURE		[Pa]	2.66
RF POWER	UPPER PORTION	[W]	800
	LOWER PORTION	[W]	700
FLOW RATE OF C_5F_8		[cm^3/minute]	16
FLOW RATE OF O_2		[cm^3/minute]	18
FLOW RATE OF Ar		[cm^3/minute]	800
ELECTRODE TEMPERATURE			
	UPPER PORTION	(℃)	60
	LOWER PORTION	(℃)	20
TEMPERATURE OF WALL SURFACE		[℃]	50
ELECTRODE GAP		[mm]	21

FIG. 14

PARAMETERS			
PRESSURE		[Pa]	2.66
RF POWER	UPPER PORTION	[W]	1800
	LOWER PORTION	[W]	1500
FLOW RATE OF C_5F_8		[cm^3/minute]	24
FLOW RATE OF O_2		[cm^3/minute]	28
FLOW RATE OF Ar		[cm^3/minute]	700
ELECTRODE TEMPERATURE			
	UPPER PORTION	(℃)	60
	LOWER PORTION	(℃)	20
TEMPERATURE OF WALL SURFACE		[℃]	50
ELECTRODE GAP		[mm]	19

FIG. 15

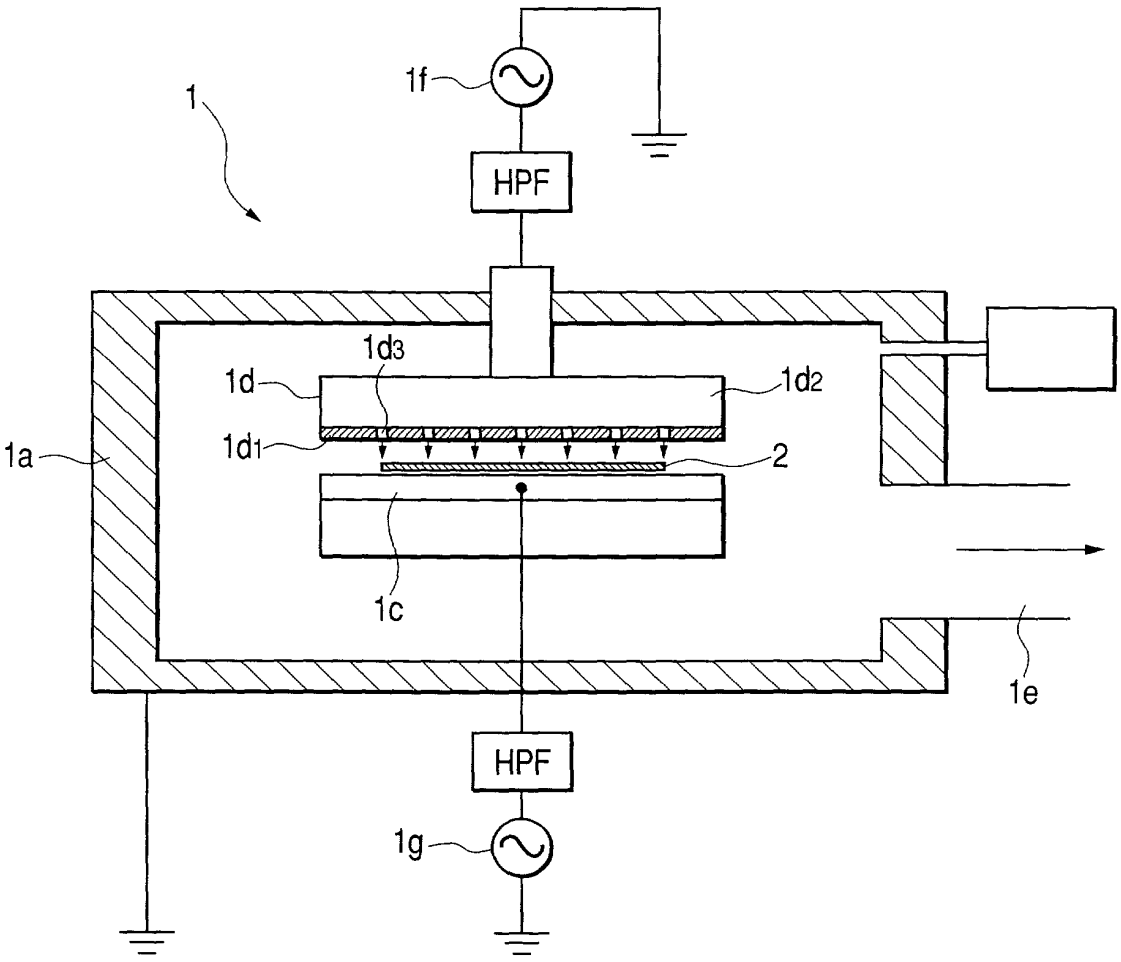


FIG. 16

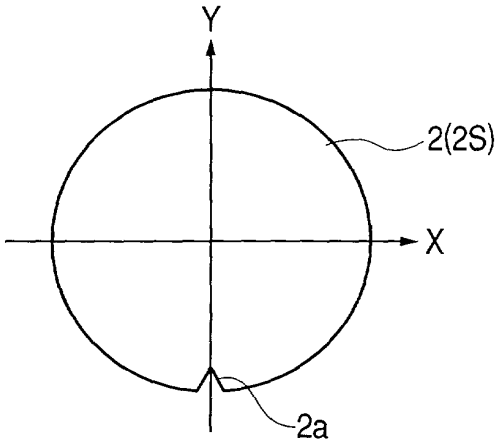


FIG. 17

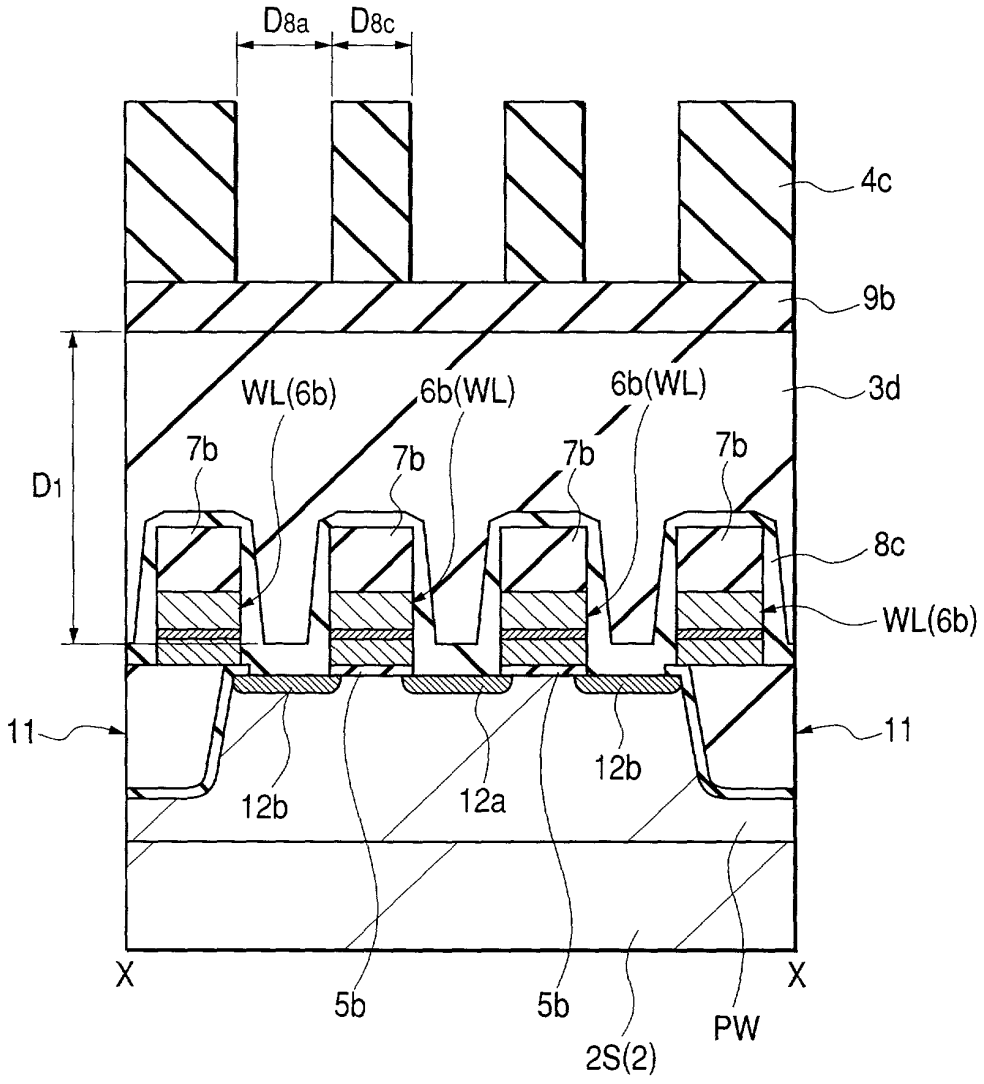

D8a
D8c
4c
9b
3d
WL(6b)
6b(WL)
6b(WL)
7b
7b
7b
7b
D1
8c
WL(6b)
11
11
12b
12a
12b
X
X
5b
5b
2S(2)
PW

FIG. 18

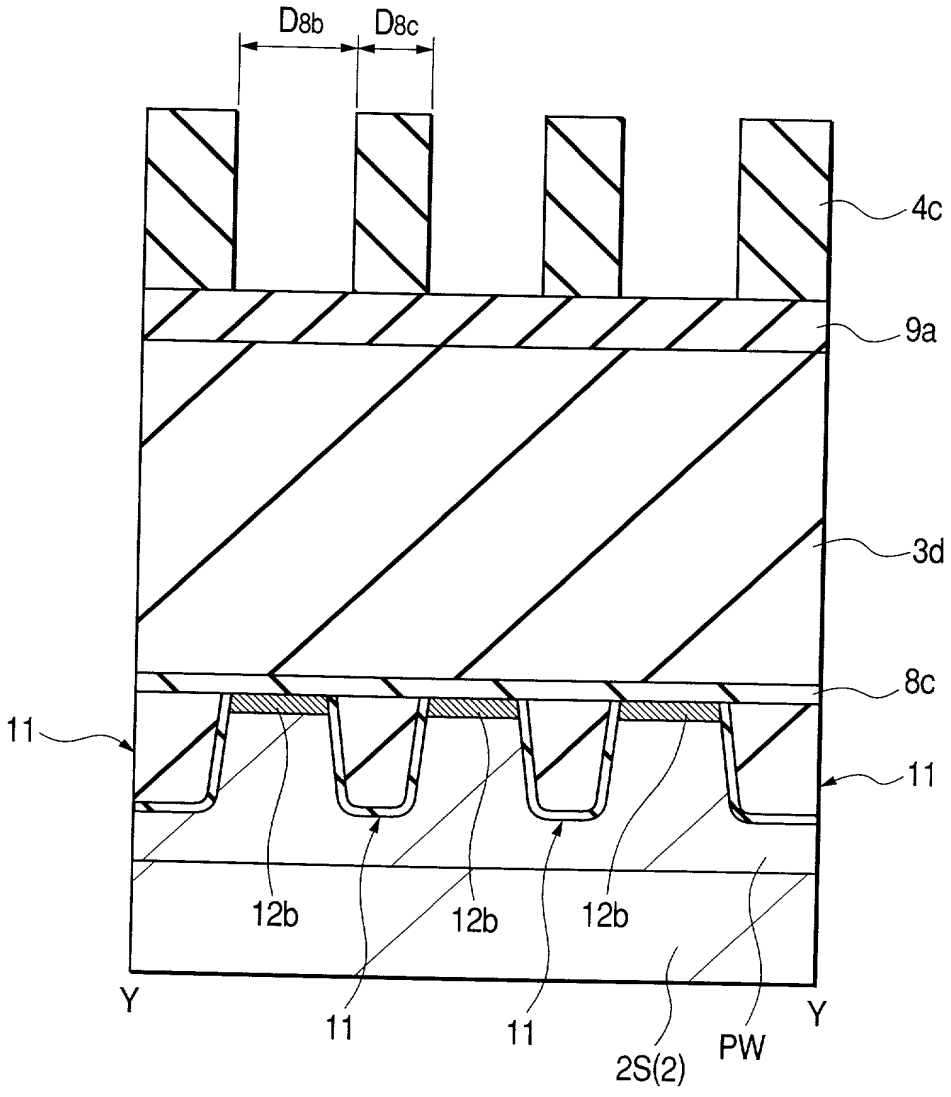


FIG. 19

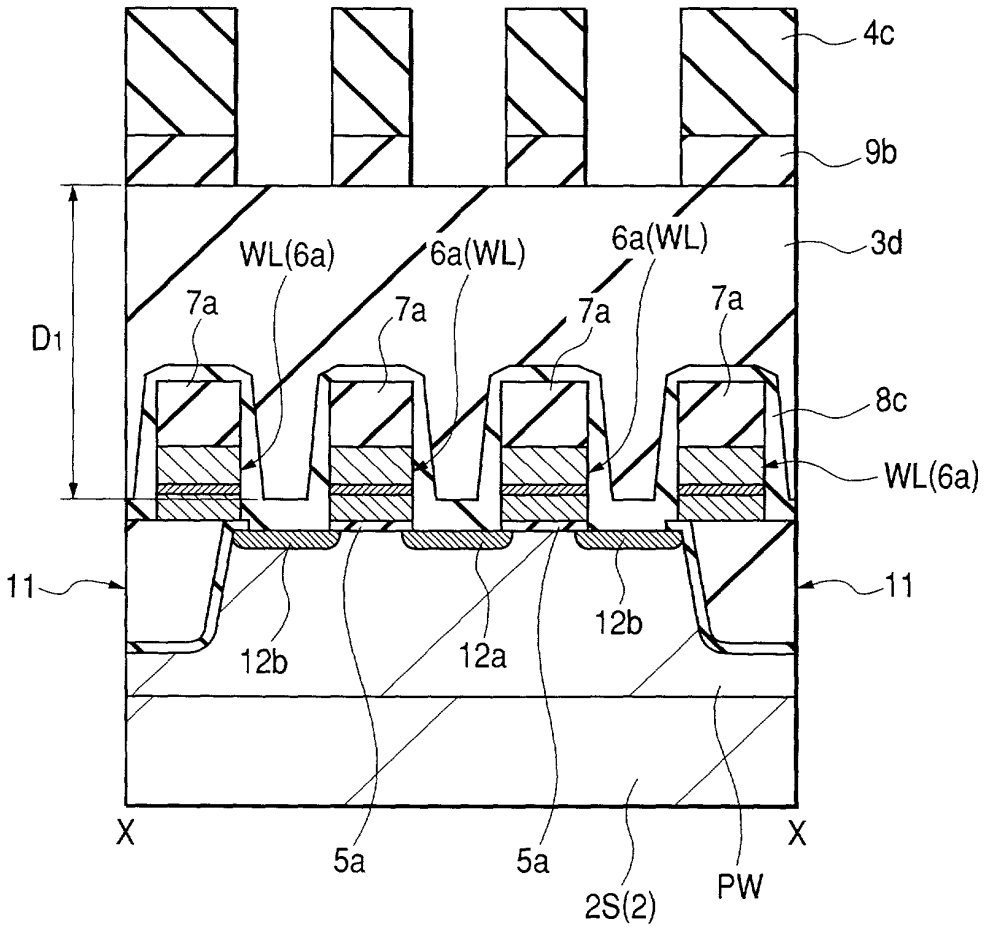

4c
9b
3d
WL(6a)
6a(WL)
6a(WL)
7a
7a
7a
7a
D1
8c
WL(6a)
11
11
12b
12a
12b
X
X
5a
5a
2S(2)
PW

FIG. 20

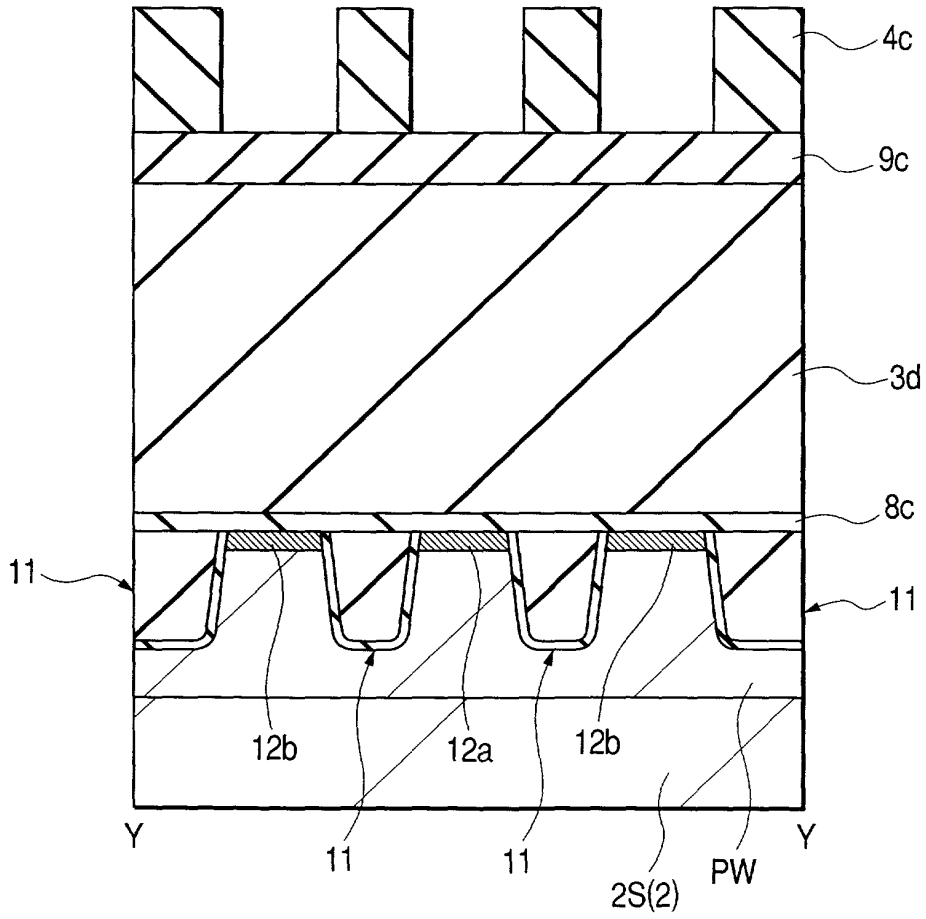


FIG. 21

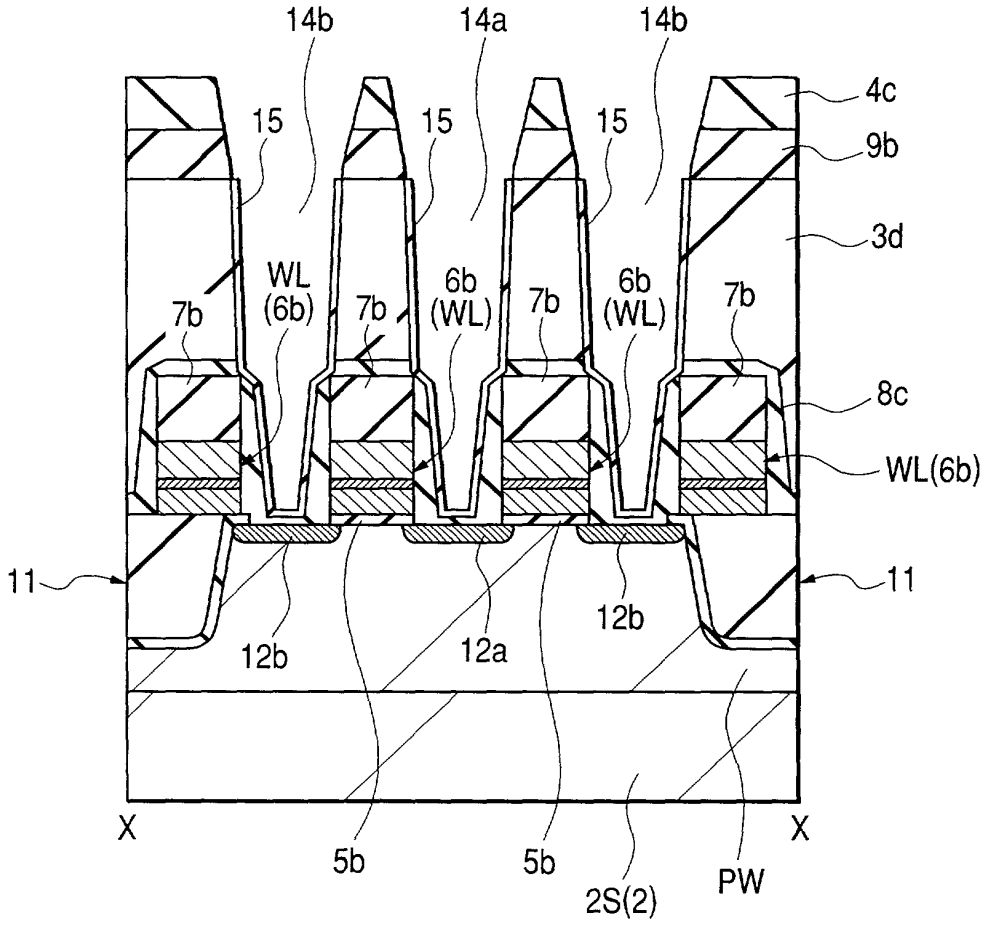

14b
14a
14b
15
15
15
4c
9b
3d
WL
(6b)
6b
(WL)
6b
(WL)
7b
7b
7b
7b
8c
WL(6b)
11
11
12b
12a
12b
X
X
5b
5b
2S(2)
PW

FIG. 22

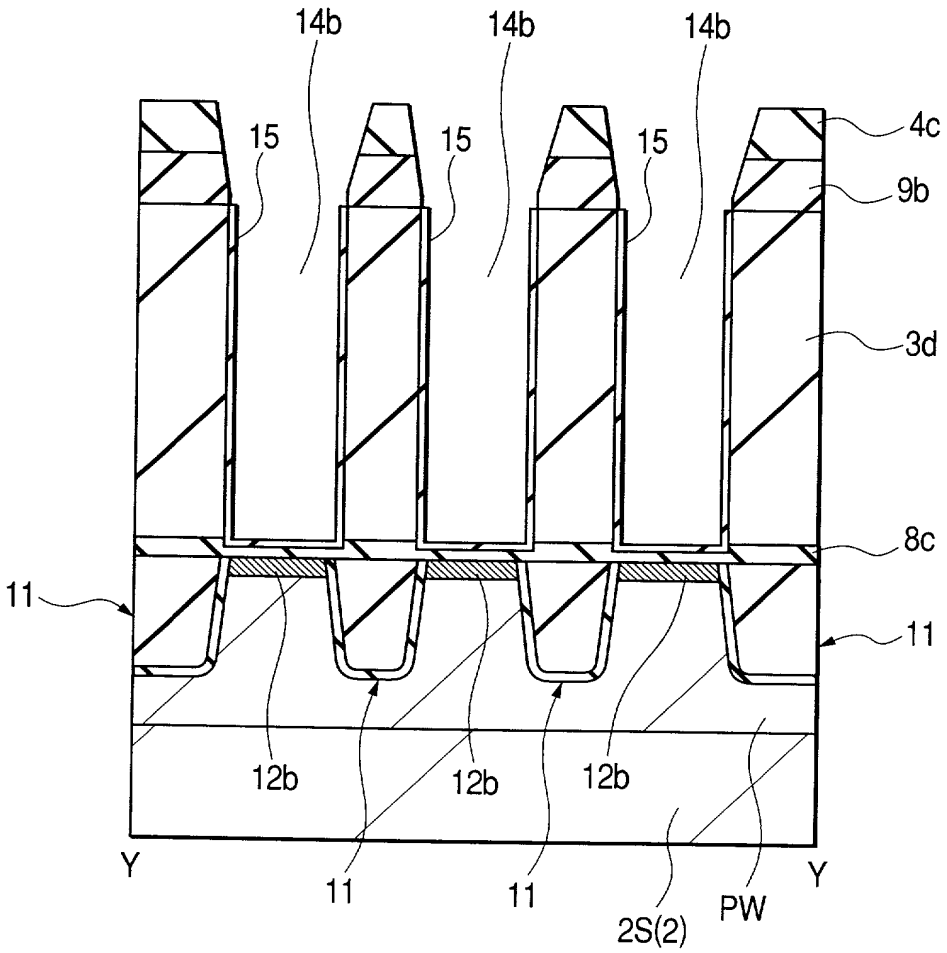


FIG. 23

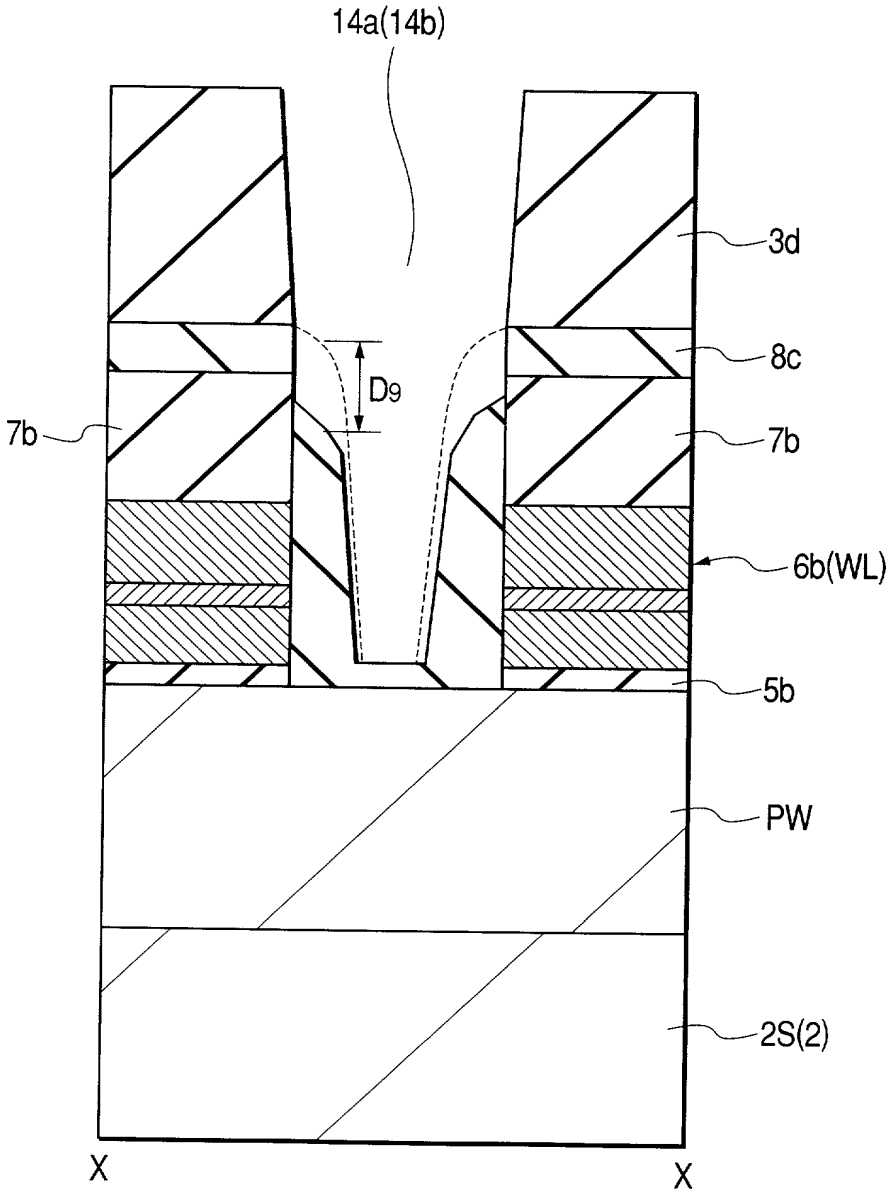


FIG. 24

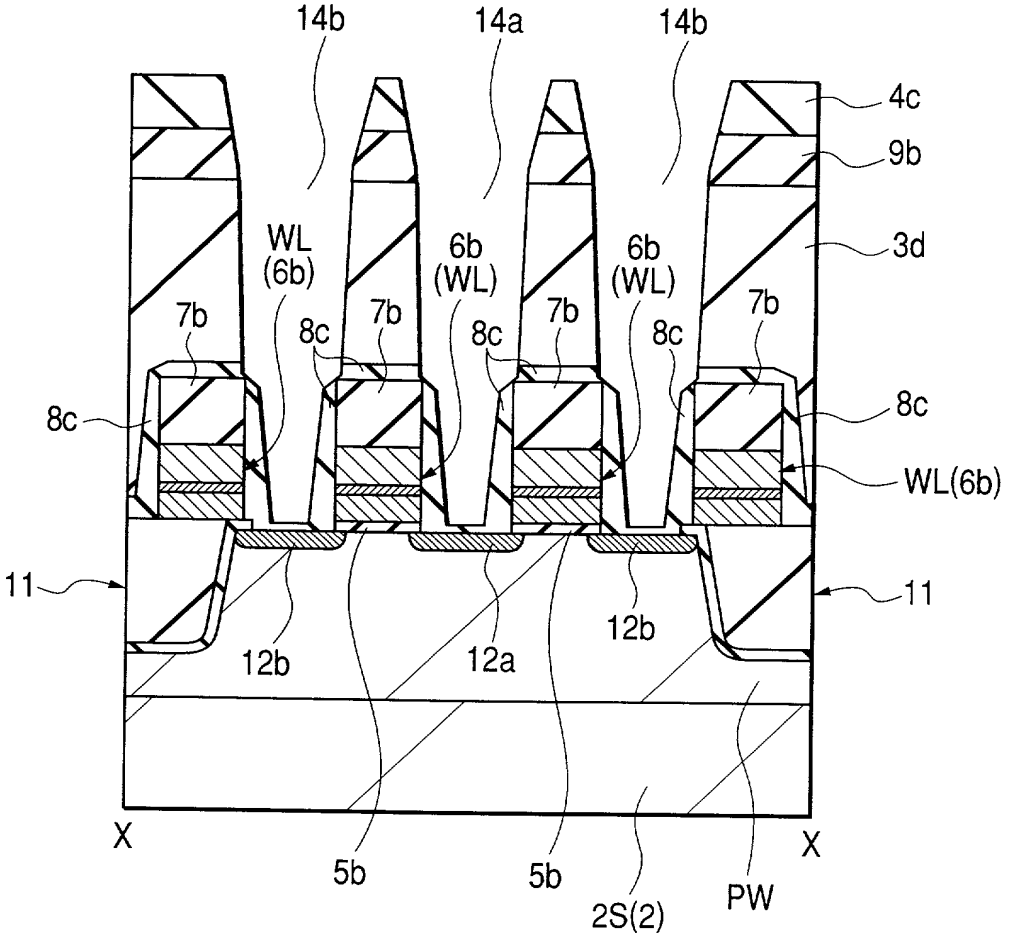

14b
14a
14b
4c
9b
3d
WL
(6b)
6b
(WL)
6b
(WL)
7b
8c
7b
8c
7b
8c
7b
8c
8c
WL(6b)
11
11
12b
12a
12b
X
X
5b
5b
2S(2)
PW

FIG. 25

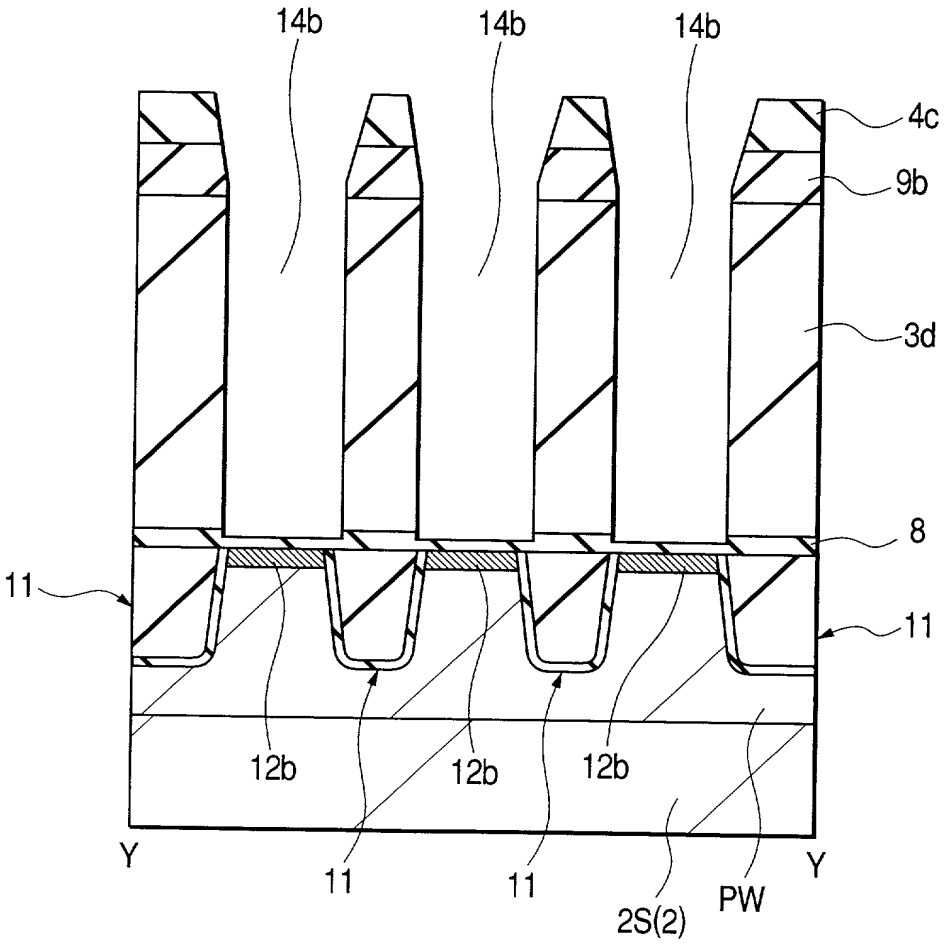


FIG. 26

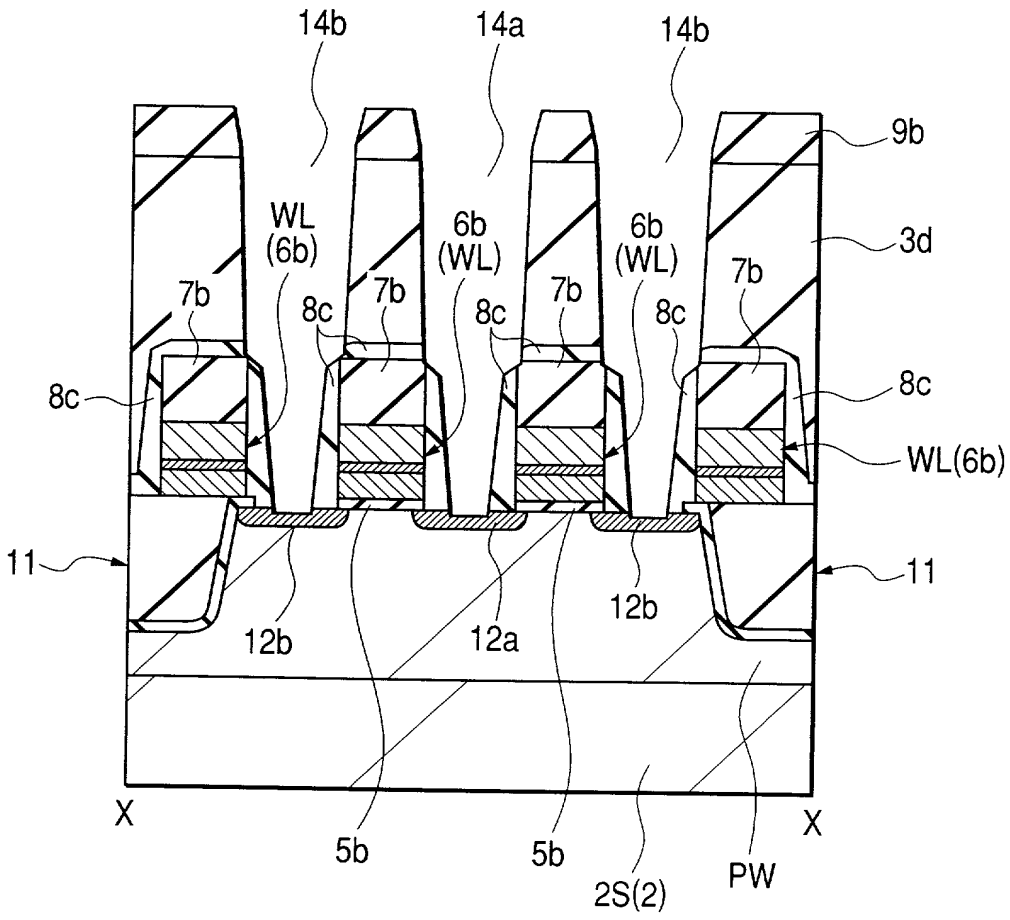

14b
14a
14b
9b
WL
(6b)
6b
(WL)
6b
(WL)
3d
7b
8c
7b
8c
7b
8c
7b
8c
8c
WL(6b)
11
11
12b
12a
12b
X
X
5b
5b
2S(2)
PW

FIG. 27

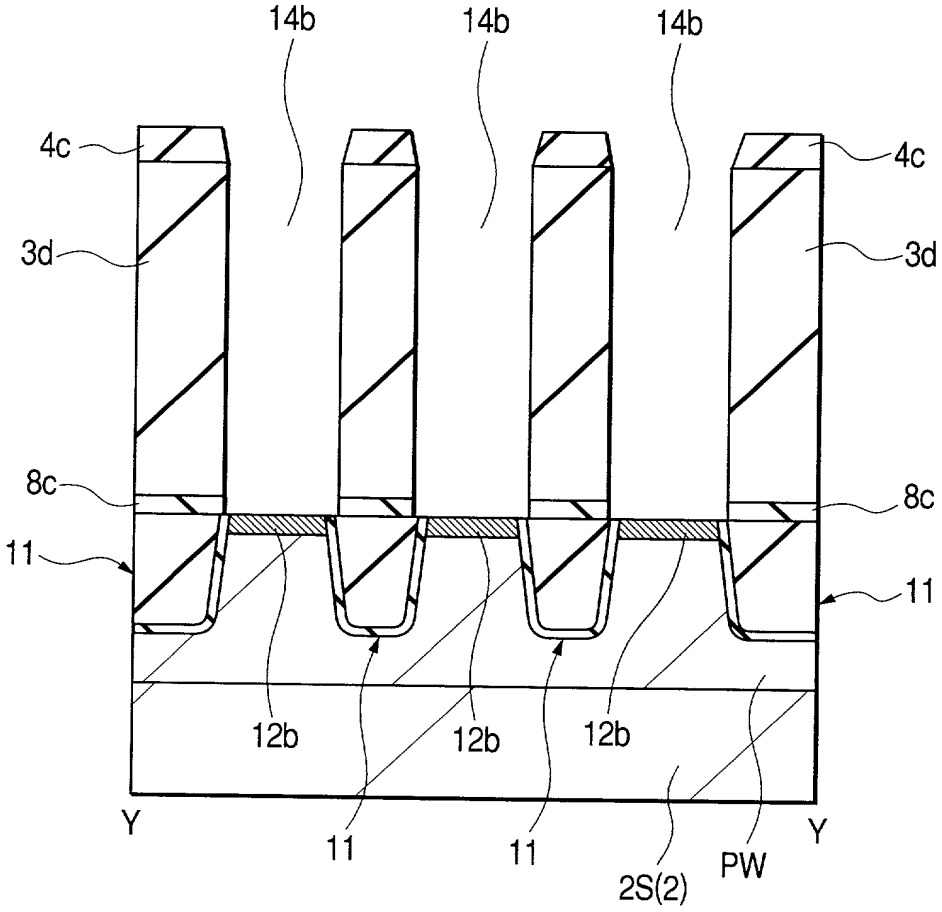


FIG. 28

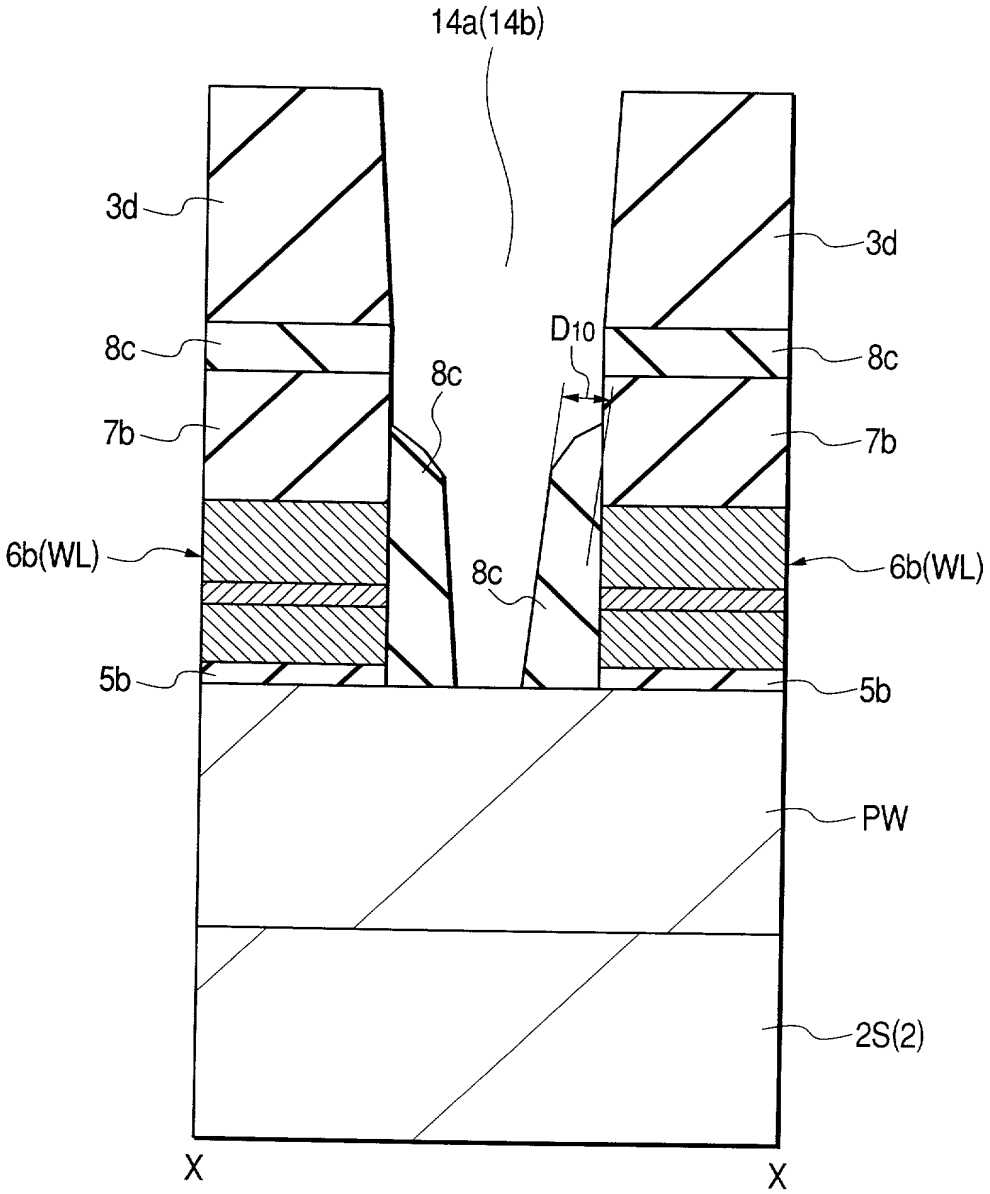


FIG. 29

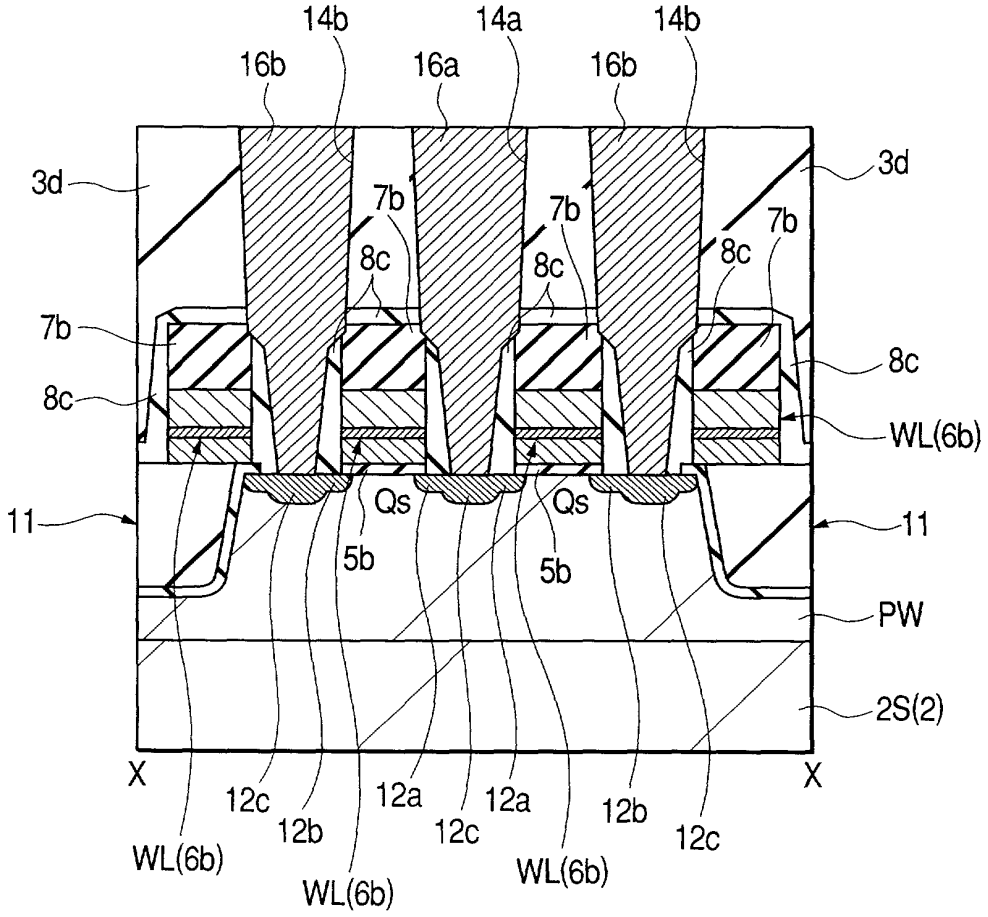

14b
14a
14b
16b
16a
16b
3d
3d
7b
7b
7b
8c
8c
8c
7b
8c
8c
WL(6b)
11
Qs
Qs
11
5b
5b
PW
2S(2)
X
X
12c
12b
12a
12a
12b
12c
WL(6b)
WL(6b)
WL(6b)

FIG. 30

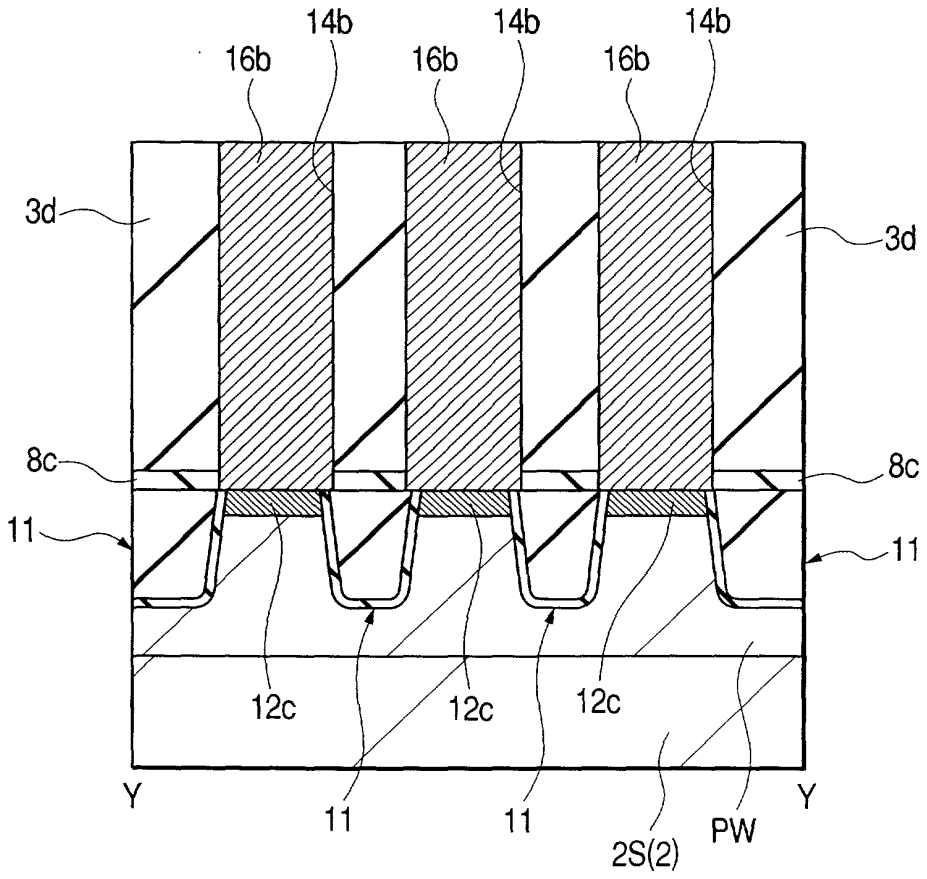

14b
16b
14b
16b
14b
16b
3d
3d
8c
8c
11
11
12c
12c
12c
Y
Y
11
11
2S(2)
PW

FIG. 31

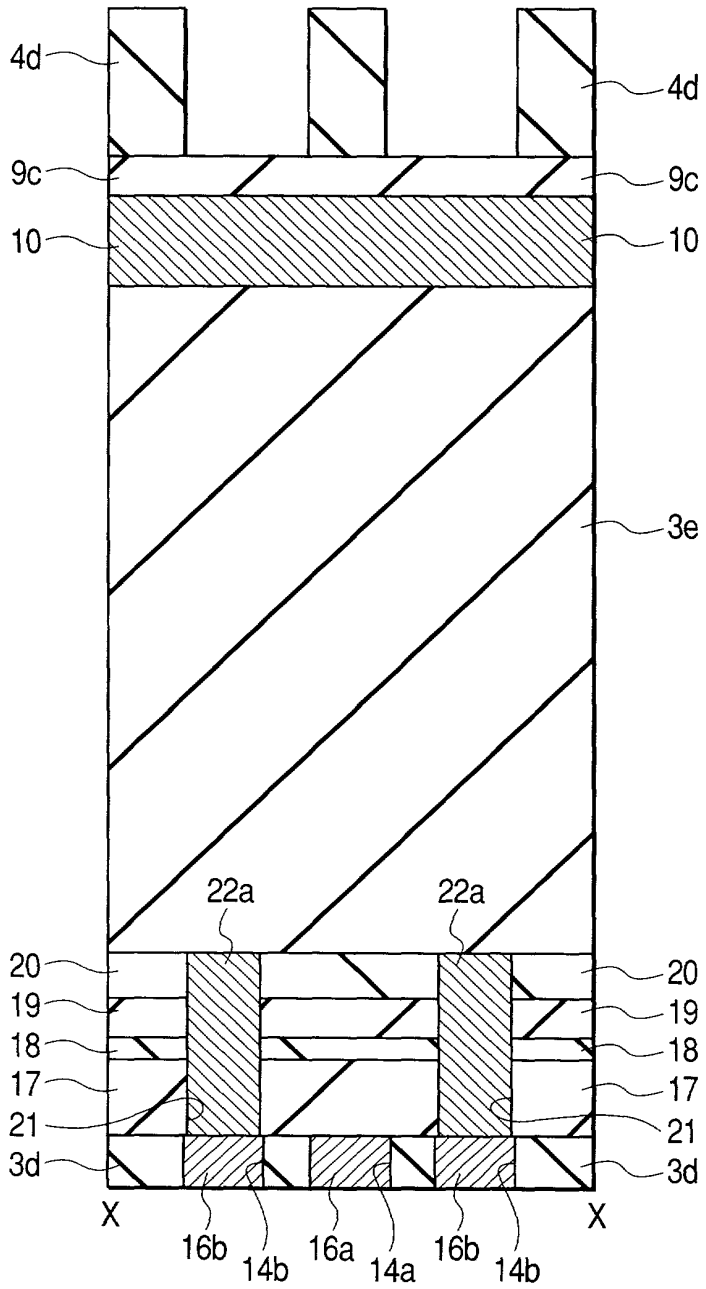

4d
4d
9c
9c
10
10
3e
22a
22a
20
20
19
19
18
18
17
17
21
21
3d
3d
X
X
16b
14b
16a
14a
16b
14b

FIG. 32

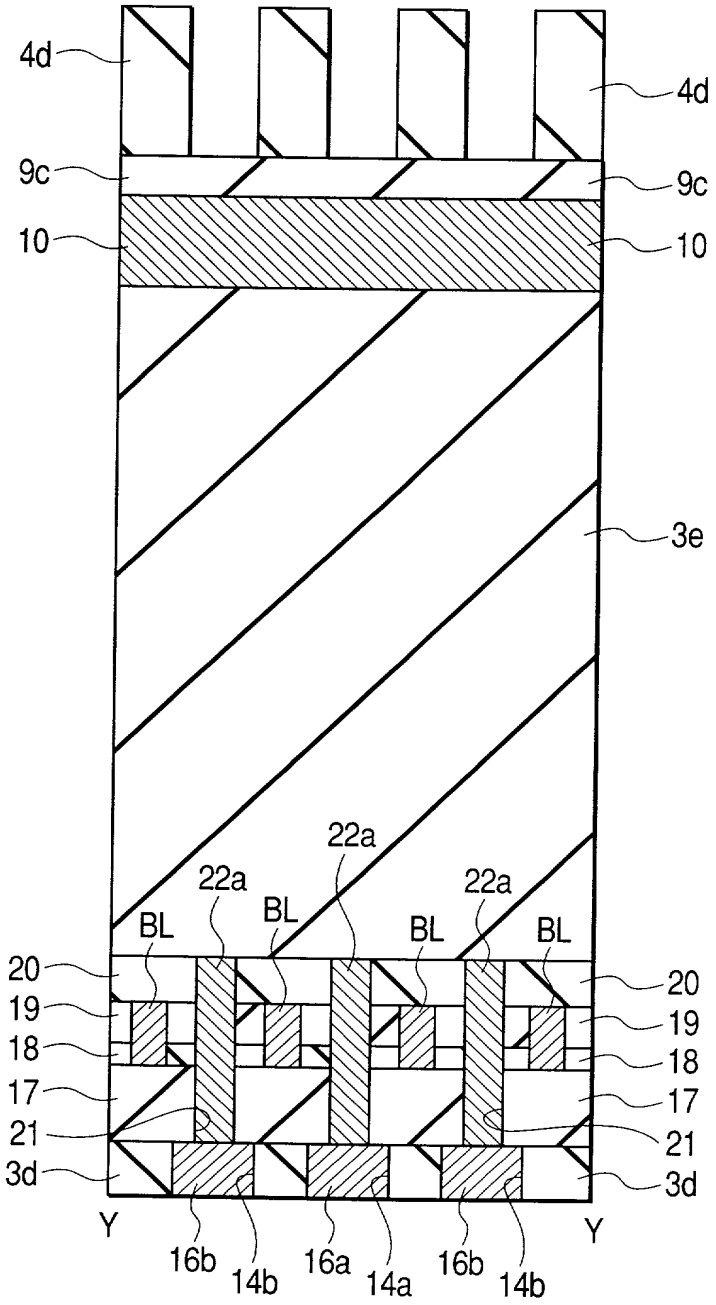

4d
4d
9c
9c
10
10
3e
22a
22a
22a
BL
BL
BL
BL
20
20
19
19
18
18
17
17
21
21
3d
3d
Y
Y
16b
14b
16a
14a
16b
14b

FIG. 33

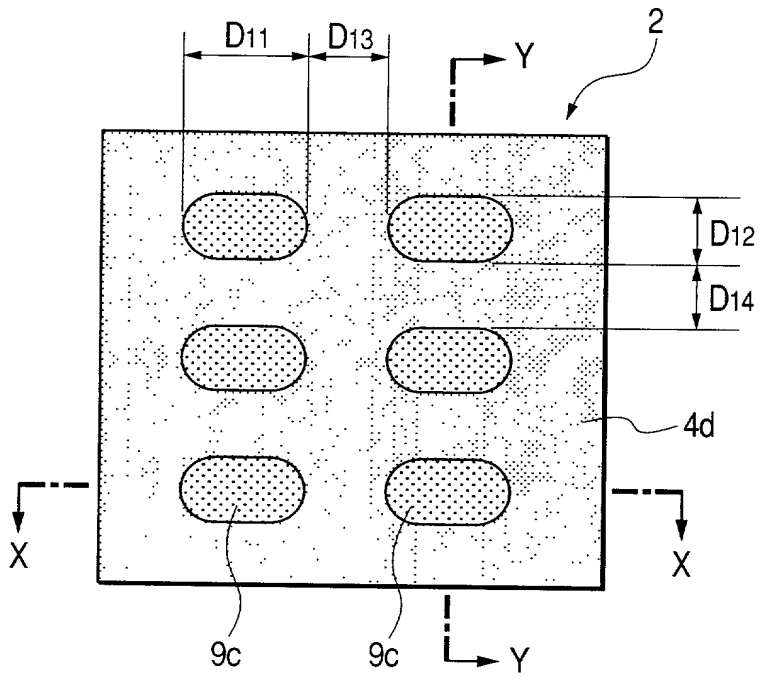


FIG. 34

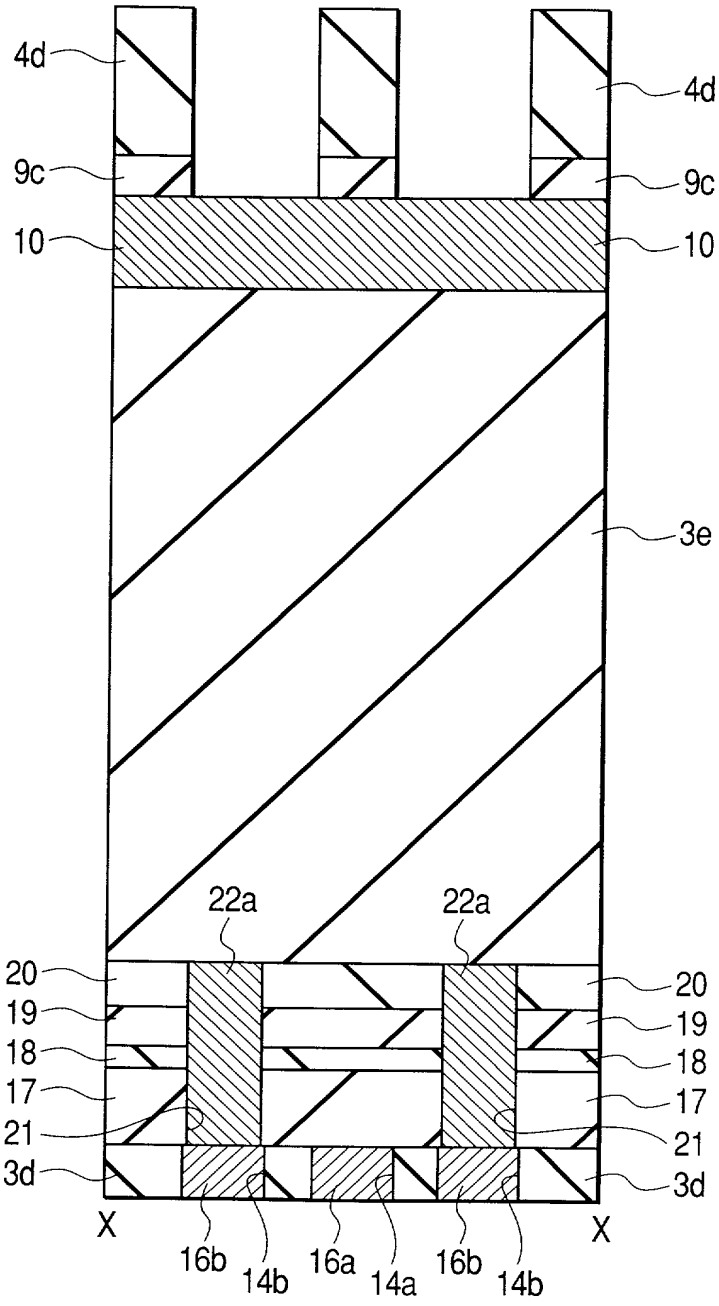

4d
4d
9c
9c
10
10
3e
22a
22a
20
19
18
17
21
3d
20
19
18
17
21
3d
X
X
16b
14b
16a
14a
16b
14b

FIG. 35

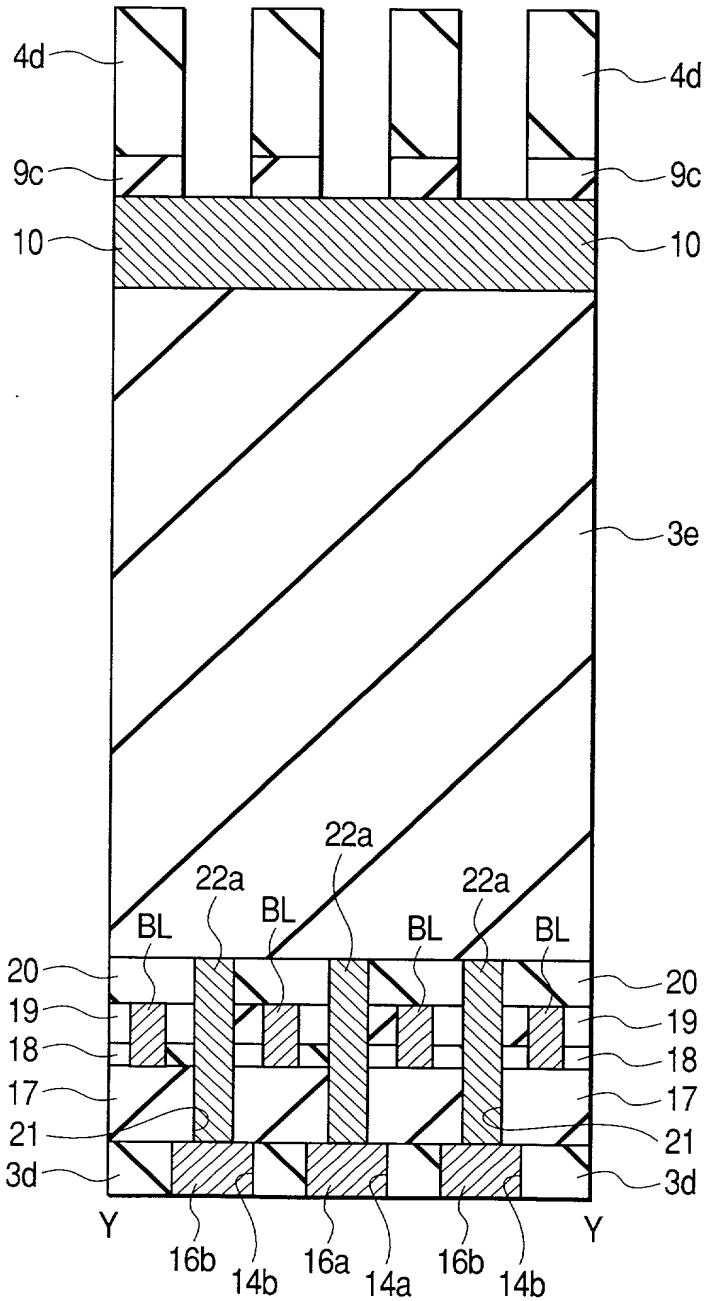

4d
4d
9c
9c
10
10
3e
22a
22a
22a
BL
BL
BL
BL
20
20
19
19
18
18
17
17
21
21
3d
3d
Y
Y
16b
14b
16a
14a
16b
14b

FIG. 36

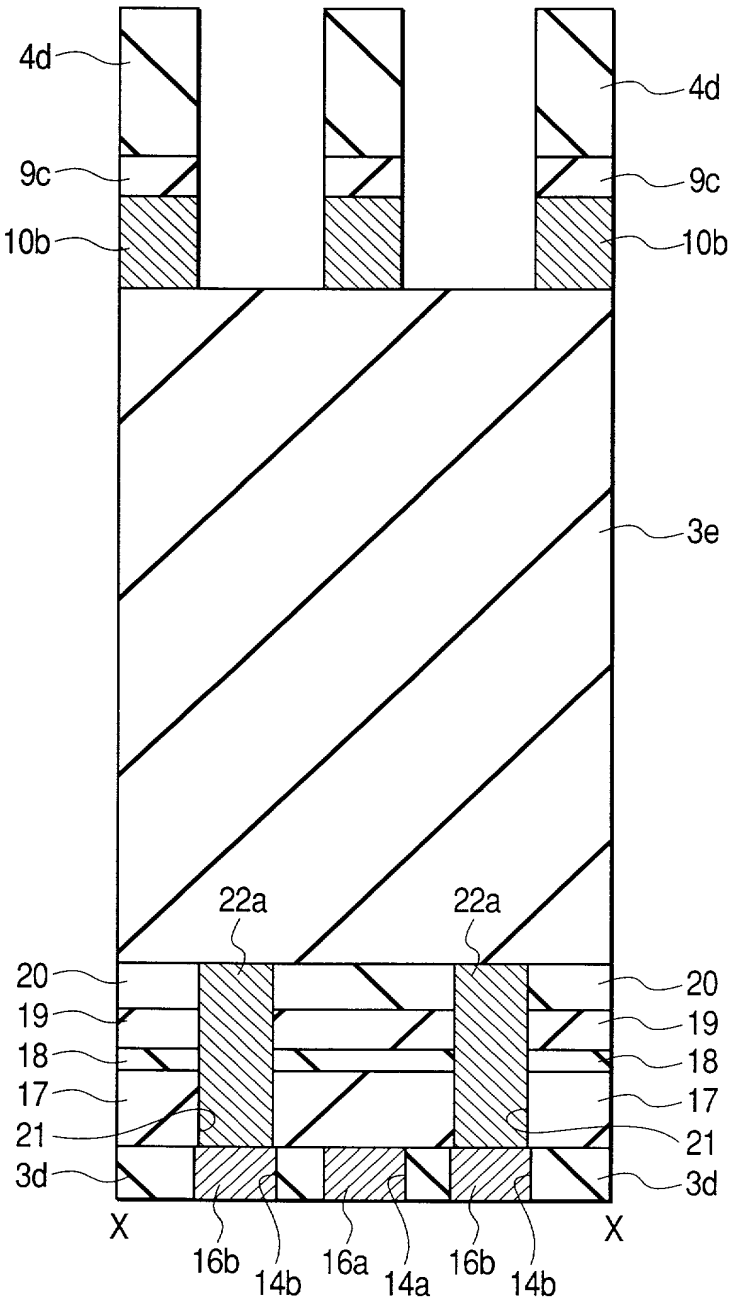

4d
4d
9c
9c
10b
10b
3e
22a
22a
20
20
19
19
18
18
17
17
21
21
3d
3d
X
X
16b
14b
16a
14a
16b
14b

FIG. 37

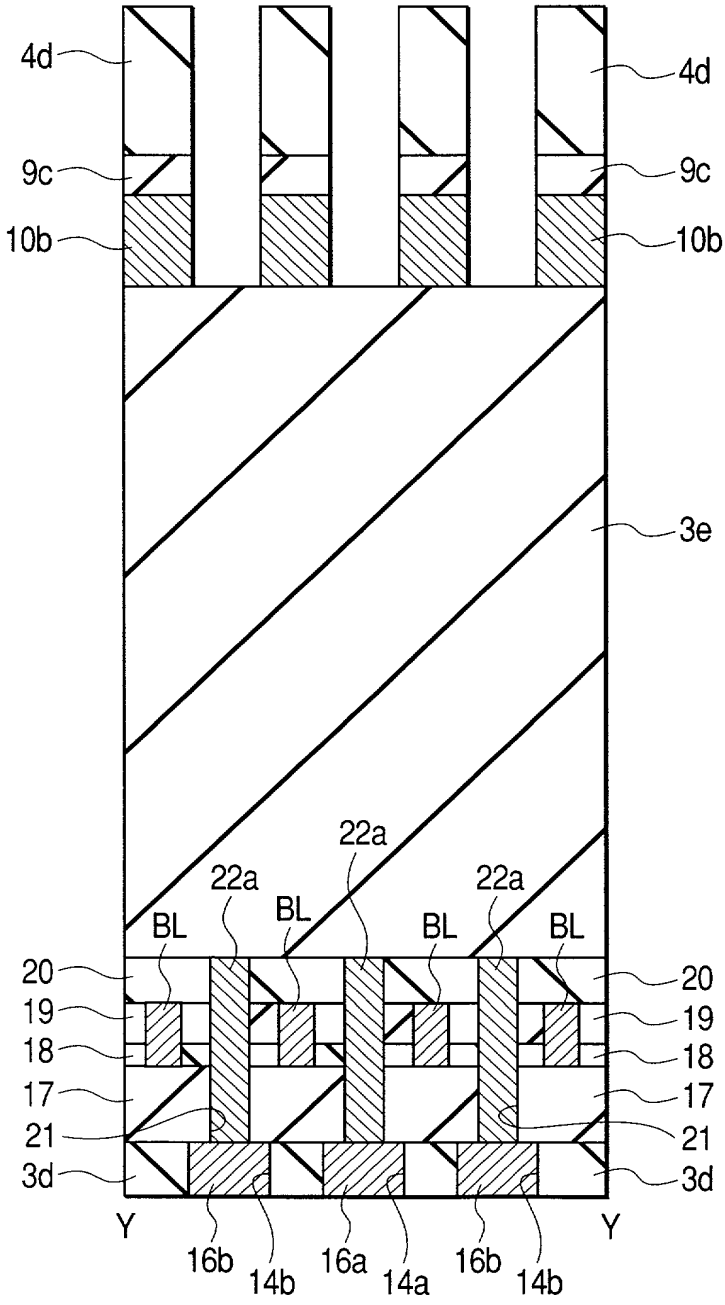

4d
4d
9c
9c
10b
10b
3e
22a
22a
22a
BL
BL
BL
BL
20
20
19
19
18
18
17
17
21
21
3d
3d
Y
Y
16b
14b
16a
14a
16b
14b

FIG. 38

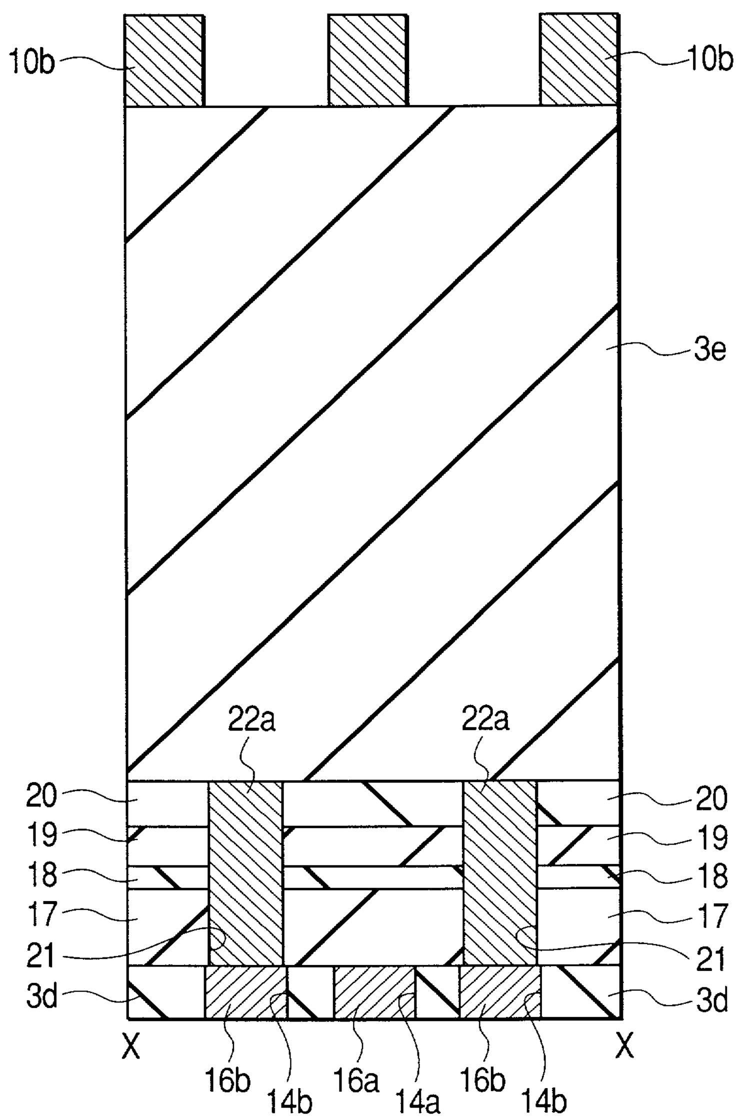

10b
10b
3e
22a
22a
20
20
19
19
18
18
17
17
21
21
3d
3d
X
X
16b
14b
16a
14a
16b
14b

FIG. 39

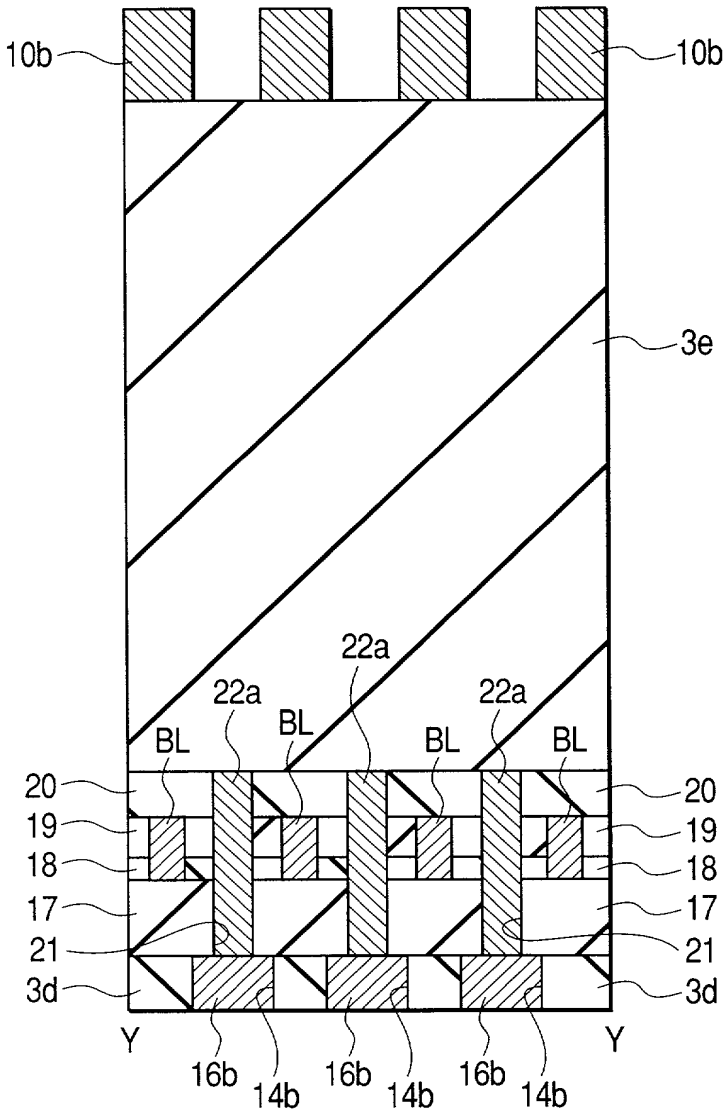

10b
10b
3e
22a
22a
22a
BL
BL
BL
BL
20
19
18
17
21
3d
20
19
18
17
21
3d
Y
Y
16b
14b
16b
14b
16b
14b

FIG. 40

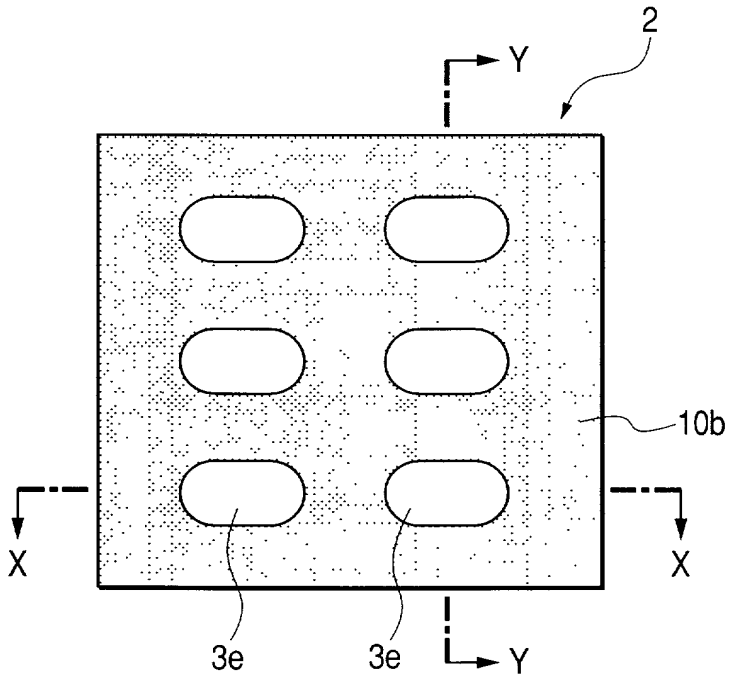


FIG. 41

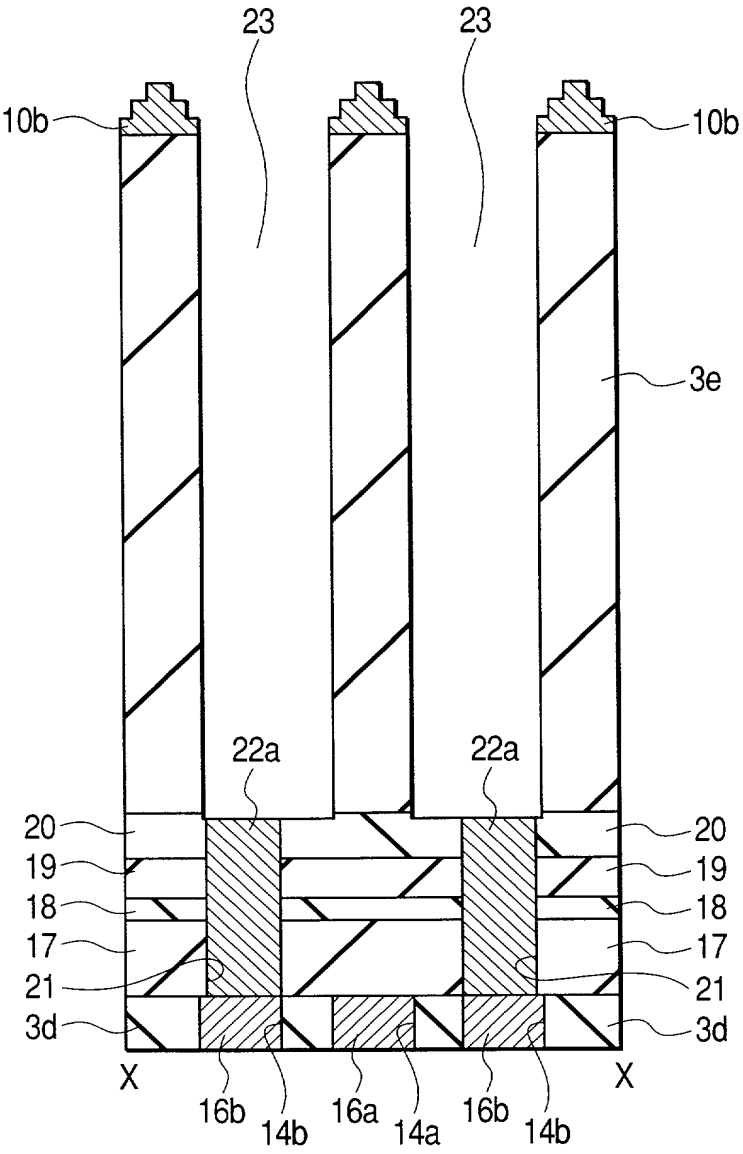

23
23
10b
10b
3e
22a
22a
20
19
18
17
21
3d
20
19
18
17
21
3d
X
X
16b
14b
16a
14a
16b
14b

FIG. 42

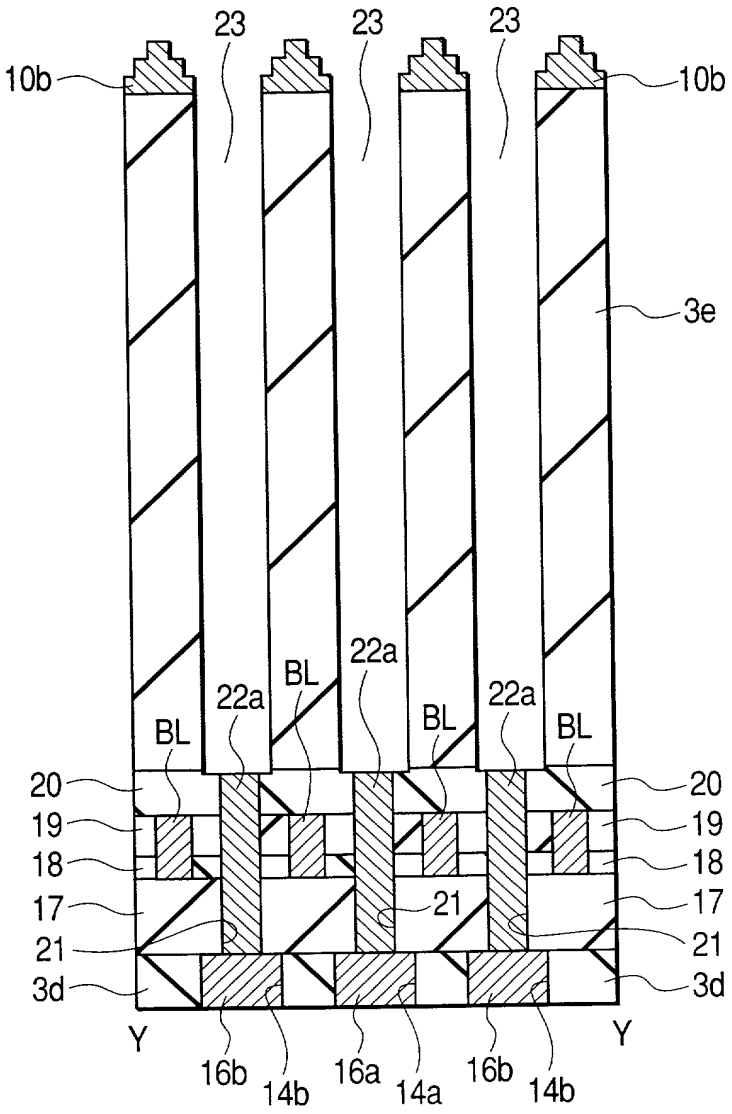

23
23
23
10b
10b
3e
22a
22a
22a
BL
BL
BL
BL
20
19
18
17
21
3d
21
20
19
18
17
21
3d
Y
Y
16b
14b
16a
14a
16b
14b

FIG. 43

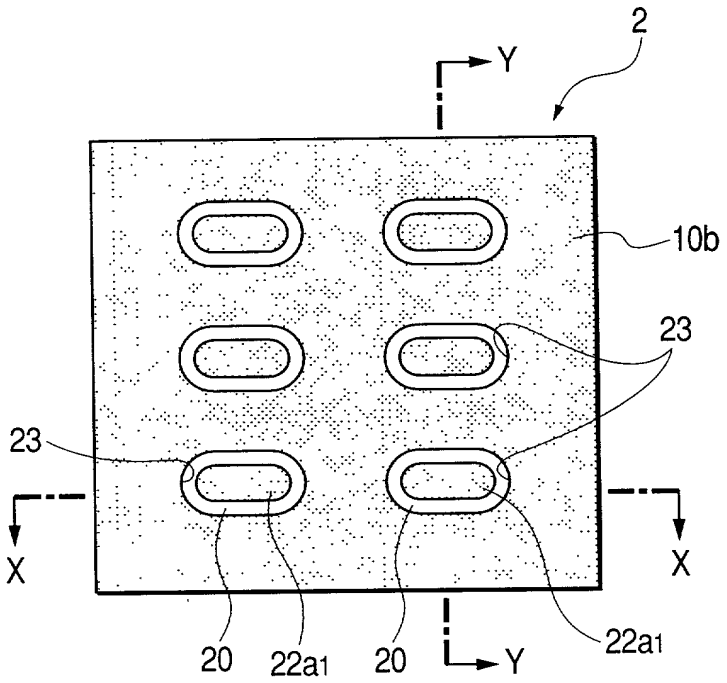


FIG. 44

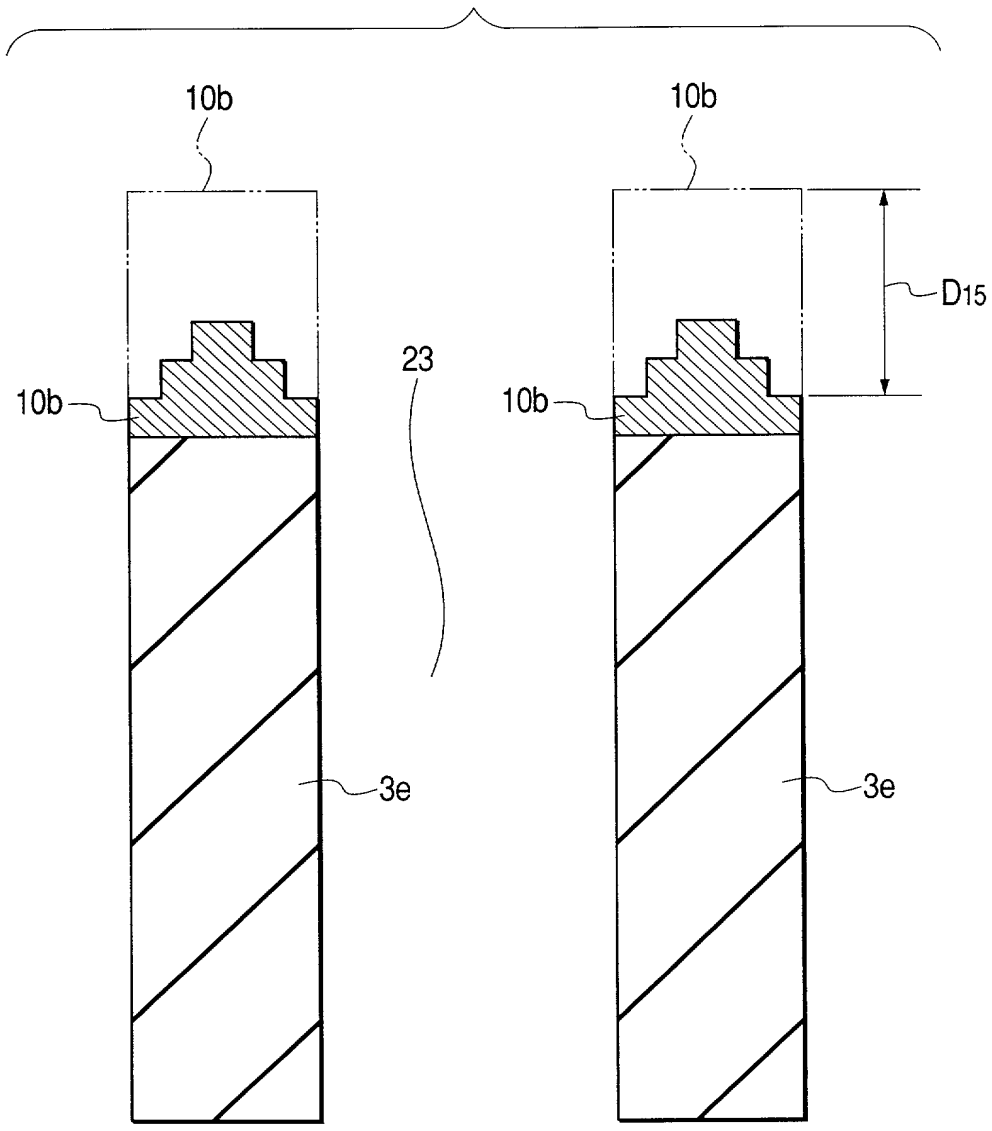


FIG. 45

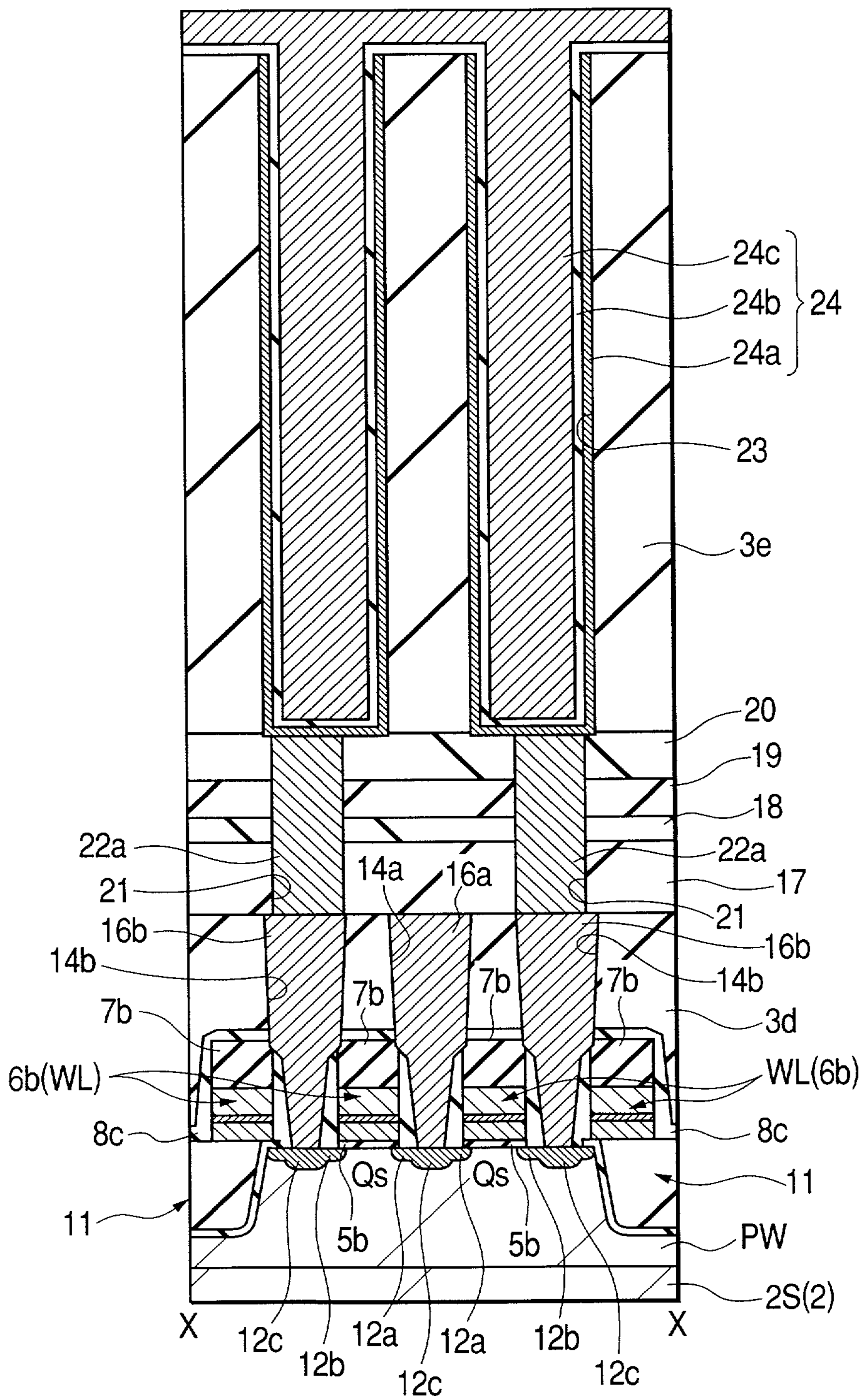


FIG. 46

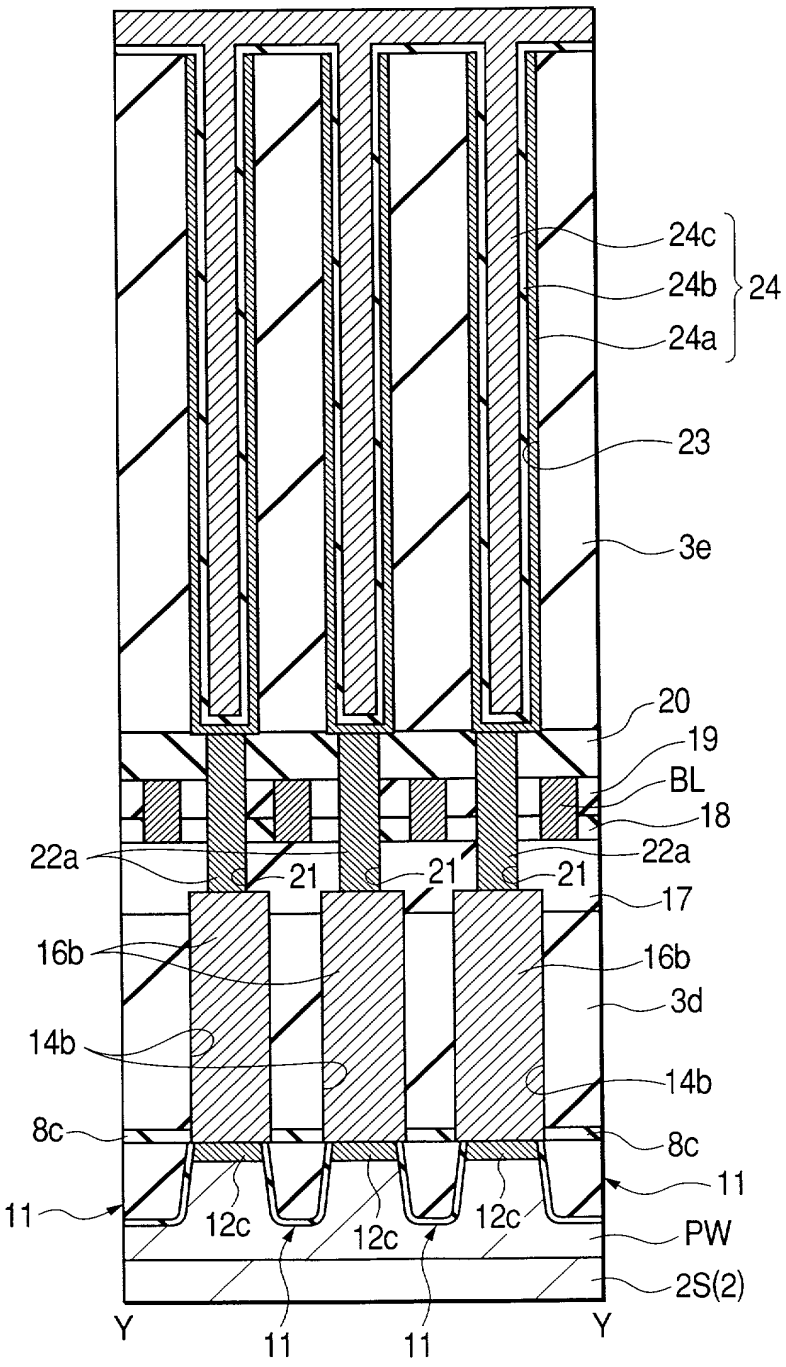

24c
24b
24
24a
23
3e
20
19
BL
18
22a
21
21
21
22a
17
16b
16b
3d
14b
14b
8c
8c
11
11
12c
12c
12c
PW
2S(2)
Y
11
11
Y

FIG. 47

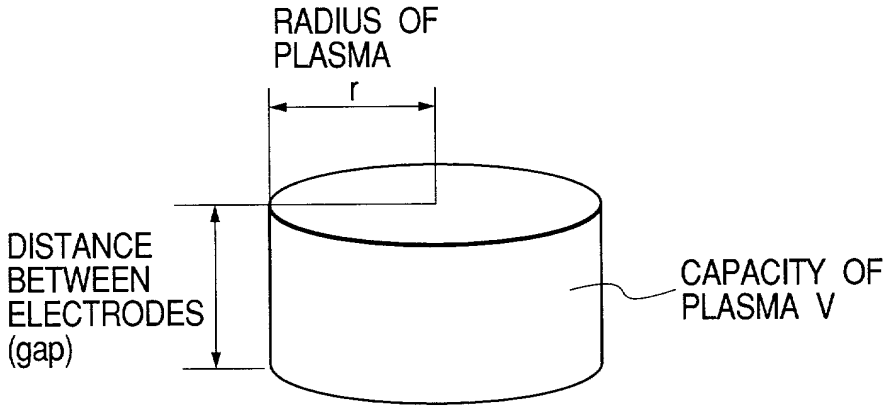
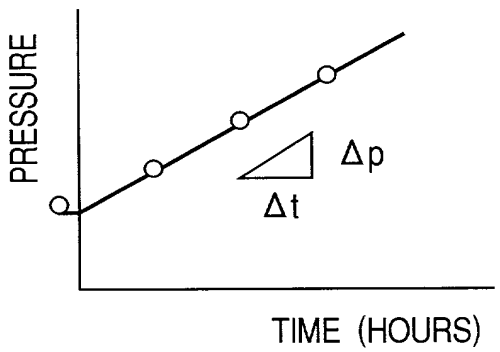

RADIUS OF
PLASMA
r
DISTANCE
BETWEEN
ELECTRODES
(gap)
CAPACITY OF
PLASMA V

FIG. 48


PRESSURE
Δp
Δt
TIME (HOURS)